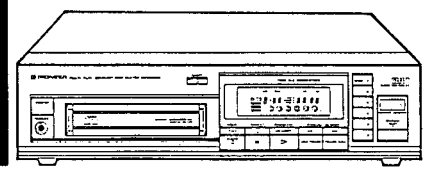
PIONEER®
The future of sound and vision.

Service Manual



ORDER NO.
ARP1534

MULTI-PLAY COMPACT DISC PLAYER

PD-X940M

MODEL PD-X940M HAS TWO VERSIONS:

Type	Power requirement	Export destination
HEM	AC220V, 240V (Switchable)*	European continent
HB	AC220V, 240V (Switchable)*	United Kingdom

*Change the connection wire from Power switch board assembly to Transformer board assembly.

- **This manual is applicable to the HEM and HB types.**
- **For the HB type, refer to page 67.**
- **As to the DISASSEMBLY, please refer to the PD-M50, PD-M40 and PD-M40-S service manual (ARP1342).**
- **As to mechanism descriptions, please refer to the PD-M50, PD-M40 and PD-M40-S service manual (ARP1369).**
- **Ce manuel pour le service comprend les explications en français de réglage.**
- **Este manual de servicio trata del método de ajuste escrito en español.**

CONTENTS

1. SAFETY INFORMATION 2
2. SPECIFICATIONS 4
3. PANEL FACILITIES 5
4. PACKING 8
5. EXPLODED VIEWS AND PARTS LIST 9
6. SCHEMATIC DIAGRAM 15
7. P.C. BOARDS CONNECTION DIAGRAM 19
8. ELECTRICAL PARTS LIST 31
9. ADJUSTMENTS 34
   RÉGLAGES 45
   AJUSTE 56
10. FOR HB TYPE 67

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS SERVICE INC. P.O. Box 1760, Long Beach, California 90801 U.S.A.
PIONEER ELECTRONICS OF CANADA, INC. 505 Cochrane Drive, Markham, Ontario L3R 8E3 Canada
PIONEER ELECTRONIC [EUROPE] N.V. Keetberglaan 1, 2740 Beveren, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY. LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia TEL: [03] 580-9911

MA © MAY 1988 Printed in Japan

1. SAFETY INFORMATION

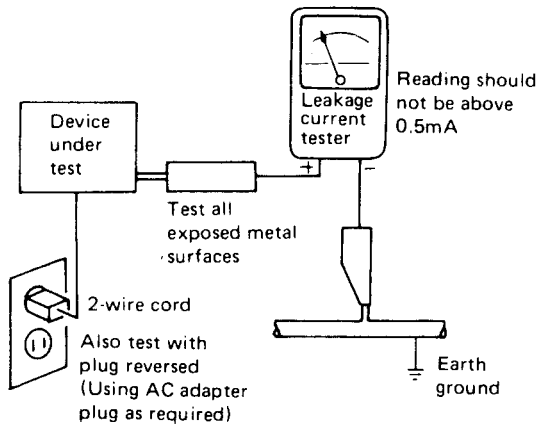
(FOR USA MODEL ONLY)

1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.


Leakage current tester
Reading should not be above 0.5mA
Device under test
Test all exposed metal surfaces
2-wire cord
Also test with plug reversed (Using AC adapter plug as required)
Earth ground

AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a ⚠ on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

(FOR EUROPEAN MODEL ONLY)

VAROITUS!

LAITE SISÄLTÄÄ LASERDIODIN, JOKA LÄHETTÄÄ NÄKYMÄTÖNTÄ, SILMILLE VAARALLISTA INFRAPUNASÄTEILYÄ LAITTEEN SISÄLLÄ ON LASERDIODIN LÄHEISYYDESSÄ KUVAN 1. MUKAINEN VAROITUSMERKKI.

LASER
Kuva 1
Lasersateilyn varoitusmerkki

ADVERSEL:

USYNLIG LASERSTRÅLING VED ÅBNING NÅR SIKKERHEDSAFBRYDERE ER UDE AF FUNKTION UNDGÅ UDSAETTELSE FOR STRÅLING.

VIKTIGT

APARATEN INNEHÅLLER LASER AV HÖGRE KLASS ÄN 1. INGREPP I APPARATEN BÖR GÖRAS AV SPECIELLT UTBILDAD PERSONAL.

WARNING!

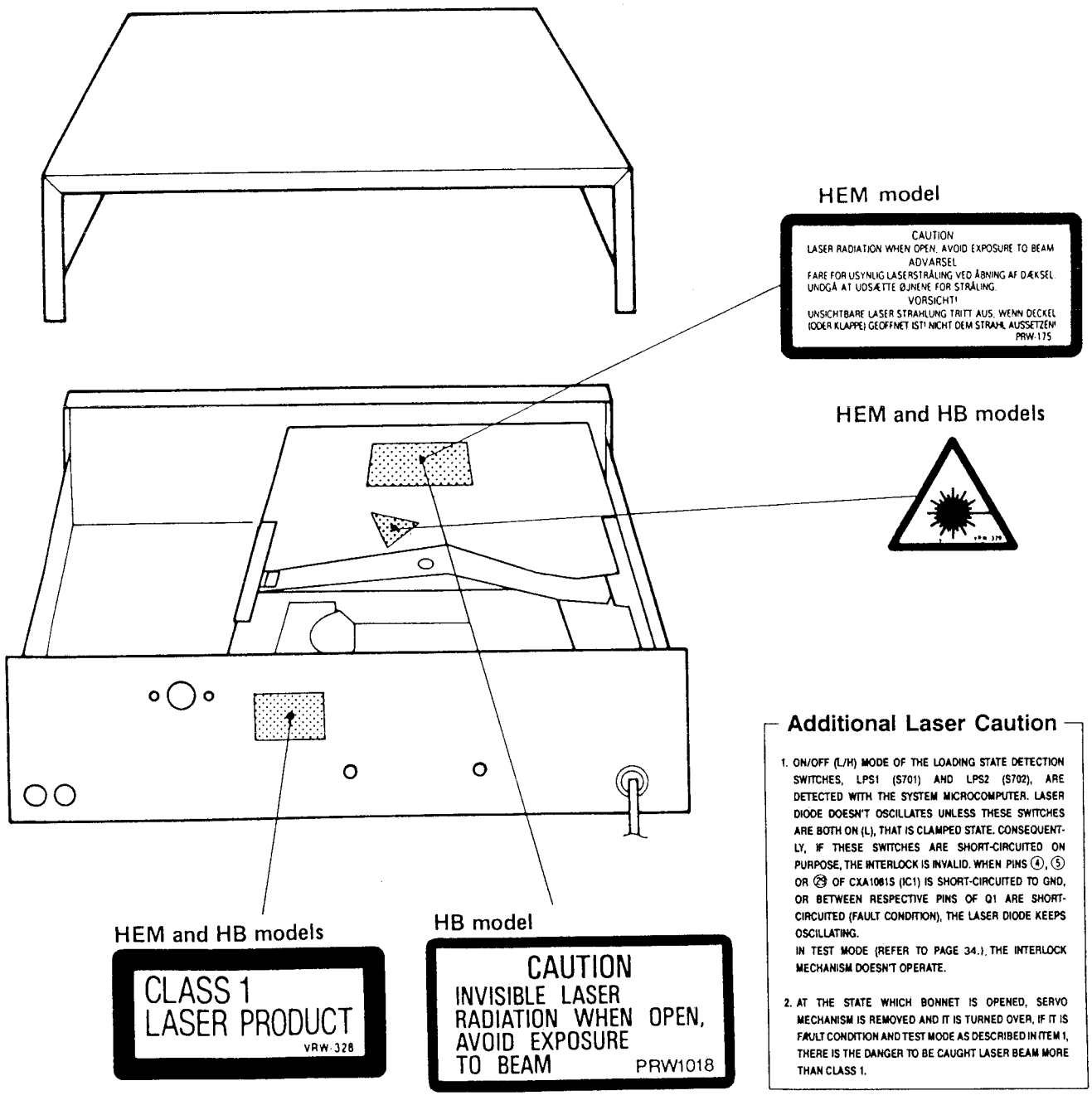
DEVICE INCLUDES LASER DIODE WHICH EMITS INVISIBLE INFRARED RADIATION WHICH IS DANGEROUS TO EYES. THERE IS A WARNING SIGN ACCORDING TO PICTURE 1 INSIDE THE DEVICE CLOSE TO THE LASER DIODE.

LASER
Picture 1
Warning sign for laser radiation

IMPORTANT

PIONEER COMPACT DISC PLAYER APPARATUS CONTAINS LASER OF HIGHER CLASS THAN 1. SERVICING OPERATION OF THE APPARATUS SHOULD BE DONE BY A SPECIALLY INSTRUCTED PERSON.

LABEL CHECK



Additional Laser Caution

1. ON/OFF (L/H) MODE OF THE LOADING STATE DETECTION SWITCHES, LPS1 (S701) AND LPS2 (S702), ARE DETECTED WITH THE SYSTEM MICROCOMPUTER. LASER DIODE DOESN'T OSCILLATES UNLESS THESE SWITCHES ARE BOTH ON (L), THAT IS CLAMPED STATE. CONSEQUENTLY, IF THESE SWITCHES ARE SHORT-CIRCUITED ON PURPOSE, THE INTERLOCK IS INVALID. WHEN PINS ④, ⑤ OR ㉓ OF CXA1081S (IC1) IS SHORT-CIRCUITED TO GND, OR BETWEEN RESPECTIVE PINS OF Q1 ARE SHORT-CIRCUITED (FAULT CONDITION), THE LASER DIODE KEEPS OSCILLATING.
   IN TEST MODE (REFER TO PAGE 34.), THE INTERLOCK MECHANISM DOESN'T OPERATE.

2. AT THE STATE WHICH BONNET IS OPENED, SERVO MECHANISM IS REMOVED AND IT IS TURNED OVER, IF IT IS FAULT CONDITION AND TEST MODE AS DESCRIBED IN ITEM 1, THERE IS THE DANGER TO BE CAUGHT LASER BEAM MORE THAN CLASS 1.

2. SPECIFICATIONS

1. General

Type ..... Compact disc digital audio system
Usable discs ..... Compact Disc
Signal format ..... Sampling frequency: 44.1 kHz
Sampling bit number: 16 bit linear
Power requirements
European models ..... AC 220 V, 50/60 Hz
U.K., Australian models ..... AC 240 V, 50/60 Hz
Power consumption ..... 14 W
Operating temperature ..... +5 °C– +35 °C
Weight ..... 4.6 kg (10 lb 2 oz)
External dimensions ..... 360(W) × 318(D) × 85(H) mm
14-3/16(W) × 12-1/2(D) × 3-11/32(H) in

2. Audio section

Frequency response ..... 4 Hz–20 kHz (±0.5 dB) (EIAJ)
S/N ratio ..... more than 102 dB (EIAJ)
Dynamic range ..... more than 95 dB (EIAJ)
Channel separation ..... more than 97 dB (EIAJ)
Total harmonic distortion ..... 0.004% or less (EIAJ)
Output voltage ..... 2.0 V ±0.3 V (EIAJ)
Wow and flutter ..... less than (±0.001% W.PEAK)
(below measurable level) (EIAJ)
Channels ..... 2-channel (stereo)

3. Output Terminal

Audio line output
Headphone jack
AC outlet

4. Functions

Number of discs to be stored — maximum 6.
Basic operation keys
- PLAY, PAUSE, STOP

Search function
- Disc selection (6 keys)
- Manual search
- Track search
- Track selection (10 keys) (remoto control unit only)

Programming
- Maximum 32 steps
- Pause
- Direct programming
- Program clear

Timer start
- Timer start play

Repeat functions
- All-discs repeat
- Program repeat
- 1-disc repeat (with program)
- Track repeat (with program)

Random Play
- Random play
- Random play repeat

Switching display
- Time consumed, remaining time, and total time

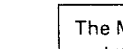
5. Display

FL tube display
- Passing time display (min, sec)
- Remaining time display
- Total time display
- Disc number, track number
- Program indicator
- Program step number
- Repeat indicator
- Random play indicator
- Play indicator
- Pause indicator
- Disc mark

6. Accessories

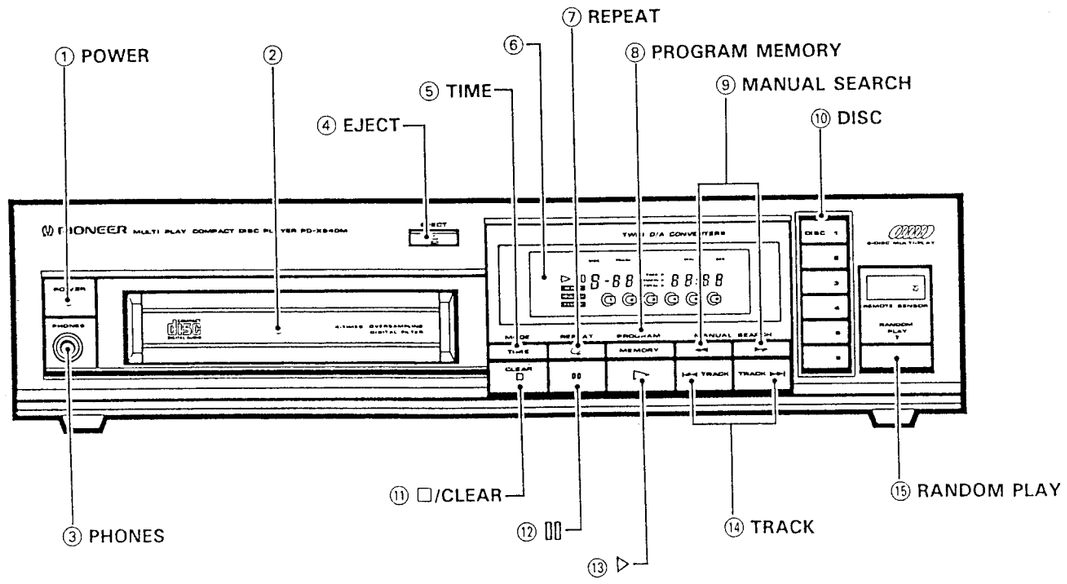
- Remote control unit 1
- AAA/R03 dry batteries 2
- Six-compact-disc magazine 1
- Single-compact-disc magazine 1
- Output cable 1
- Operating instructions 1

NOTE:
Specifications and design subject to possible modification without notice, due to improvements.

The Magazine Type Multi-Play CD Players with  mark and the Magazines with the same mark are compatible for 5-inch (12cm) discs.

3. PANEL FACILITIES

FRONT PANEL



① POWER switch

Press to turn power to the unit ON and OFF.

② Magazine insertion slot

③ PHONES (headphones) jack

When you wish to use headphones, insert the plug for the headphones into the headphones jack.

④ EJECT key

Press to eject a magazine. When pressed, any magazine (in case of single-disc magazine, the disc tray) inside is expelled forward.

⑤ TIME key

- Use to select the method for displaying the playing time on the indicator panel.
  Each time the key is pressed, the indication changes from TIME, REMAIN (track remain) and REMAIN (disc remain: This will not be displayed during programmed playback) to TOTAL in that order. For details concerning the display contents, refer to the explanation about the indicators.

⑥ Indicators

▷ (PLAY)	: Lights during playback.
▯▯ (PAUSE)	: Lights during pause mode, when playback is temporarily interrupted.
REPEAT	: Lights during repeat playback.
PROGRAM	: Lights after programming (after program has been memorized).
RANDOM	: Lights during random playback.
DISC	: Indicates disc number (1—6) during playback or search.
TRACK	: Indicates track number (01—99) during playback or search.
TIME/REMAIN/TOTAL	: Changes each time the TIME key is pressed.
● TIME	: Displays the playback time on the being played (MIN, SEC).
● REMAIN	: Displays the remaining time on the track being played. When the TIME key is pressed again, the remaining time on the disc will be displayed.
● TOTAL	: Displays the total number of tracks on one disc (TRACK) and the overall playback time (MIN, SEC).

During programmed playback operation, displays the playing time, the remaining time of the track being played and the total program steps (TOTAL).

MIN	: Playing or remaining time for the track indicated by the minute.
SEC	: Playing or remaining time for the track indicated by the second.
DISC Symbol (◎)	: If a nonexistent disc is searched for, the corresponding disc symbol will go off.

⑦ REPEAT key (⊆)

Press to perform repeat playback.

- If pressed during normal playback mode, all tracks on all the discs in the magazine will be played back repeatedly.
- If pressed during programmed playback, the programmed tracks will be repeatedly played back in the programmed order.
- In the case of random playback mode, after all the tracks have been played, random playback will start again.

⑧ PROGRAM MEMORY key

Use to program a sequence of tracks.

- Press this key after selecting a desired disc and track with DISC and TRACK scarch keys. Tunes will be added to the program in the order in which they are specified.
- If only a DISC key is pressed, all tracks on the specified disc will be added to the program. The letters 'AL' will appear on the indicator.

⑨ MANUAL SEARCH keys

When the player is in playback or pause modes, these keys are pressed to perform fast forward or reverse operations to allow manual searching. These operations are done only during the time either key is pressed.

[▶▶] : For fast forward operation. If the end of the disc is reached during fast forward operation, 'End' will be displayed and the player will enter the pause mode. [During programmed playback, the player will enter the pause mode right before it reaches the next track (program step).]

[◀◀] : For fast reverse operation. If the beginning of the disc is reached during fast reverse operation, the player will enter the playback mode. [During programmed playback, the player will enter the playback mode right before it reaches the previous track (program step).]

⑩ DISC number keys (1—6)

Use to select disc numbers for playback or programming.

⑪ Stop (□), CLEAR key

Press to stop playback. When pressed, the player goes into stop mode and all operations stop.
When pressed during stop mode, the program stored in memory is cleared.

⑫ Pause key (▯▯)

Press to temporarily interrupt playback. When pressed again, the pause mode is cancelled and playback resumes.

⑬ Play key (▷)

Press to begin playback, and to cancel the player from the pause mode.

⑭ TRACK search keys

When the player is in the normal playback, programmed playback or pause modes, these keys are pressed to search for desired track. Pressing either key causes the player to advance to the next track, or return to the previous track.

[▶▶|] : When pressed once, playback shifts to the beginning of the next track on the disc; when pressed continuously, playback shifts to the beginning of succeeding tracks on the disc. (During programmed playback, it advances to the beginning of the next programmed step.)

[|◀◀] : When pressed once, playback returns to the beginning of the currently playing track on the disc; when pressed continuously, playback shifts to the beginning of previous tracks on the disc. (During programmed playback, it returns to the beginning of the previous programmed step.)

⑮ RANDOM PLAY key

Press to begin random playback.

⑦ REPEAT key (⊂)

Press to perform repeat playback.

- If pressed during normal playback mode, all tracks on all the discs in the magazine will be played back repeatedly.
- If pressed during programmed playback, the programmed tracks will be repeatedly played back in the programmed order.
- In the case of random playback mode, after all the tracks have been played, random playback will start again.

⑧ PROGRAM MEMORY key

Use to program a sequence of tracks.

- Press this key after selecting a desired disc and track with DISC and TRACK scarch keys. Tunes will be added to the program in the order in which they are specified.
- If only a DISC key is pressed, all tracks on the specified disc will be added to the program. The letters 'AL' will appear on the indicator.

⑨ MANUAL SEARCH keys

When the player is in playback or pause modes, these keys are pressed to perform fast forward or reverse operations to allow manual searching. These operations are done only during the time either key is pressed.

[▶▶] : For fast forward operation. If the end of the disc is reached during fast forward operation, 'End' will be displayed and the player will enter the pause mode. [During programmed playback, the player will enter the pause mode right before it reaches the next track (program step).]

[◀◀] : For fast reverse operation. If the beginning of the disc is reached during fast reverse operation, the player will enter the playback mode. [During programmed playback, the player will enter the playback mode right before it reaches the previous track (program step).]

⑩ DISC number keys (1—6)

Use to select disc numbers for playback or programming.

⑪ Stop (□), CLEAR key

Press to stop playback. When pressed, the player goes into stop mode and all operations stop.
When pressed during stop mode, the program stored in memory is cleared.

⑫ Pause key (▯▯)

Press to temporarily interrupt playback. When pressed again, the pause mode is cancelled and playback resumes.

⑬ Play key (▷)

Press to begin playback, and to cancel the player from the pause mode.

⑭ TRACK search keys

When the player is in the normal playback, programmed playback or pause modes, these keys are pressed to search for desired track. Pressing either key causes the player to advance to the next track, or return to the previous track.

[▶▶|] : When pressed once, playback shifts to the beginning of the next track on the disc; when pressed continuously, playback shifts to the beginning of succeeding tracks on the disc. (During programmed playback, it advances to the beginning of the next programmed step.)

[|◀◀] : When pressed once, playback returns to the beginning of the currently playing track on the disc; when pressed continuously, playback shifts to the beginning of previous tracks on the disc. (During programmed playback, it returns to the beginning of the previous programmed step.)

⑮ RANDOM PLAY key

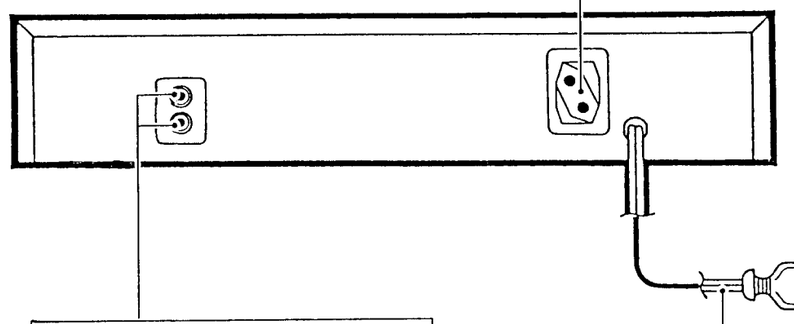
Press to begin random playback.

REAR PANEL

AC OUTLET (UNSWITCHED 100 W MAX)

Power flows continually to this outlet, regardless of whether this equipment is switched ON or OFF. Electrical power consumption of the connected equipment should not exceed 100 W.
The equipment should be disconnected by removing the mains plug from the wall socket when not in regular use, e.g. when in vacation.

NOTE:
Do not connect appliances with high power consumption such as heaters, irons, or television sets to the AC OUTLET in order to avoid overheating or fire risk.
This can cause this equipment to malfunction.

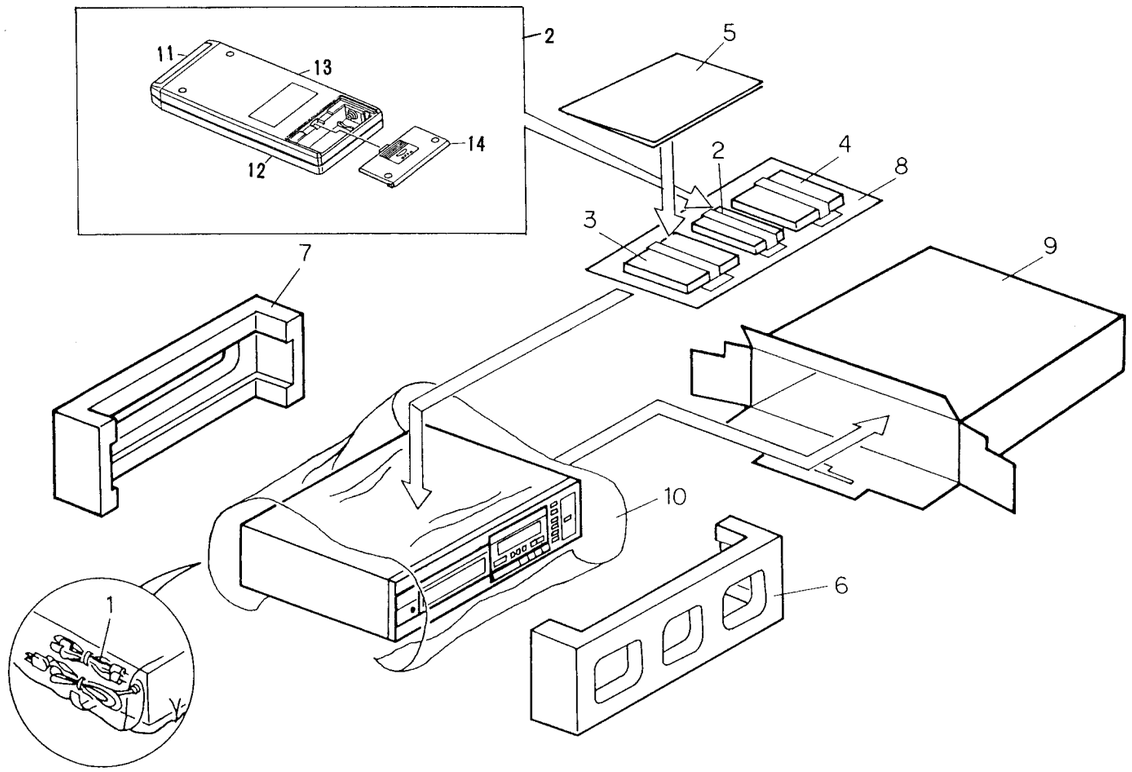


AUDIO LINE OUTPUT TERMINALS

Connect the power cord

Insert the power cord plug into the auxiliary AC outlet of your amplifier unit, or into a household wall outlet.

4. PACKING

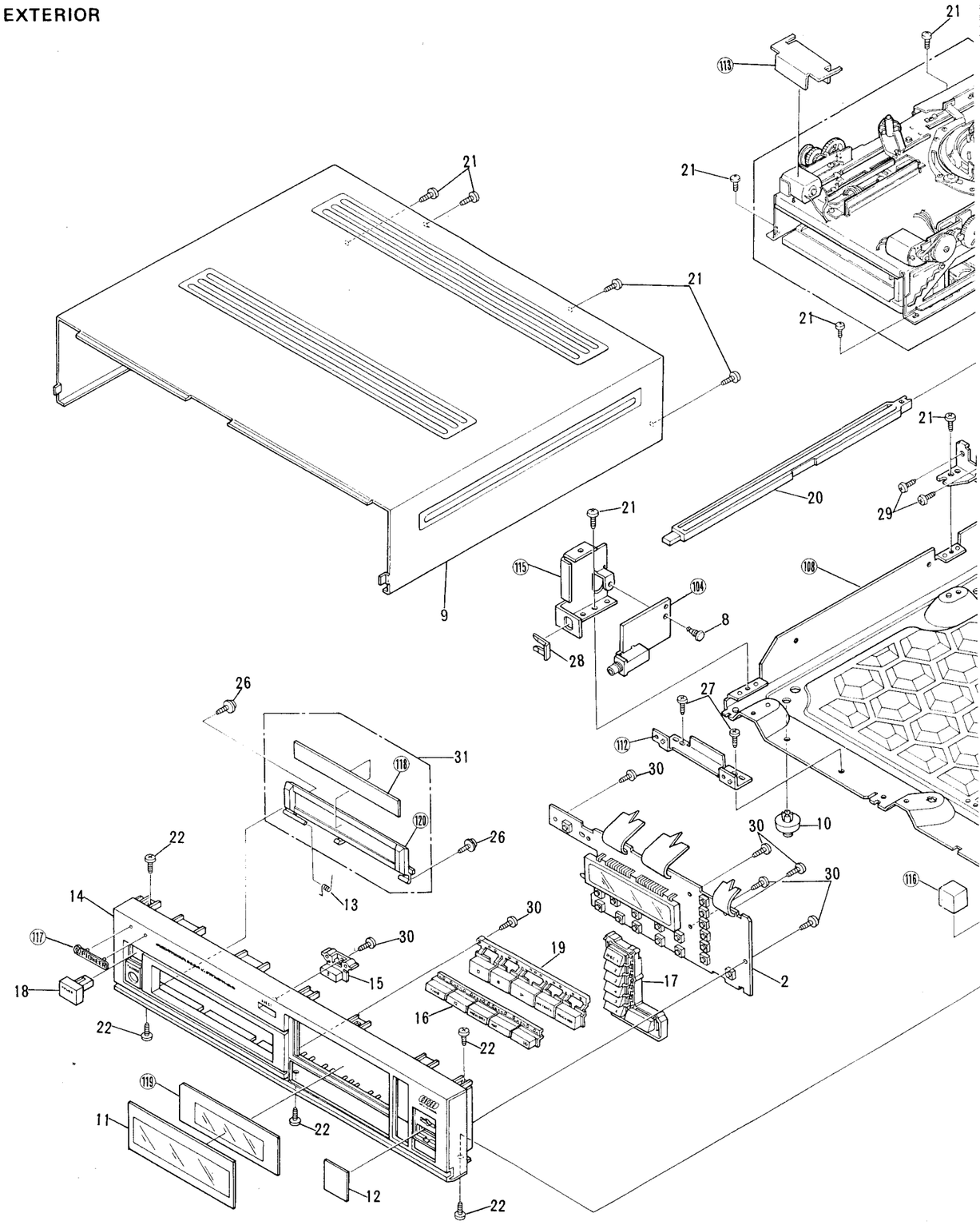


Parts List of Packing

Mark	No.	Part No.	Description
	1	PDE1023	Connection cord with pin plug
	2	PWW1008	Remote control unit
	3	PXA1043	Single magazine assembly
	4	PXA1102	Magazine assembly
	5	PRE1043	Operating instructions (English/German/French/ Italian)
		PRF1015	Operating instructions (Dutch/Swedish/Spanish/ Portuguese)
	6	PHA1051	Protector (F)
	7	PHA1052	Protector (R)
	8	PHC1008	Accessory holder
	9	PHG1176	CD packing case
	10	Z23-007	Mirror mat sheet
	11	PAM1071	Filter
	12	PNW1151	Case (T)
	13	PNW1152	Case (B)
	14	PNW1153	Cover

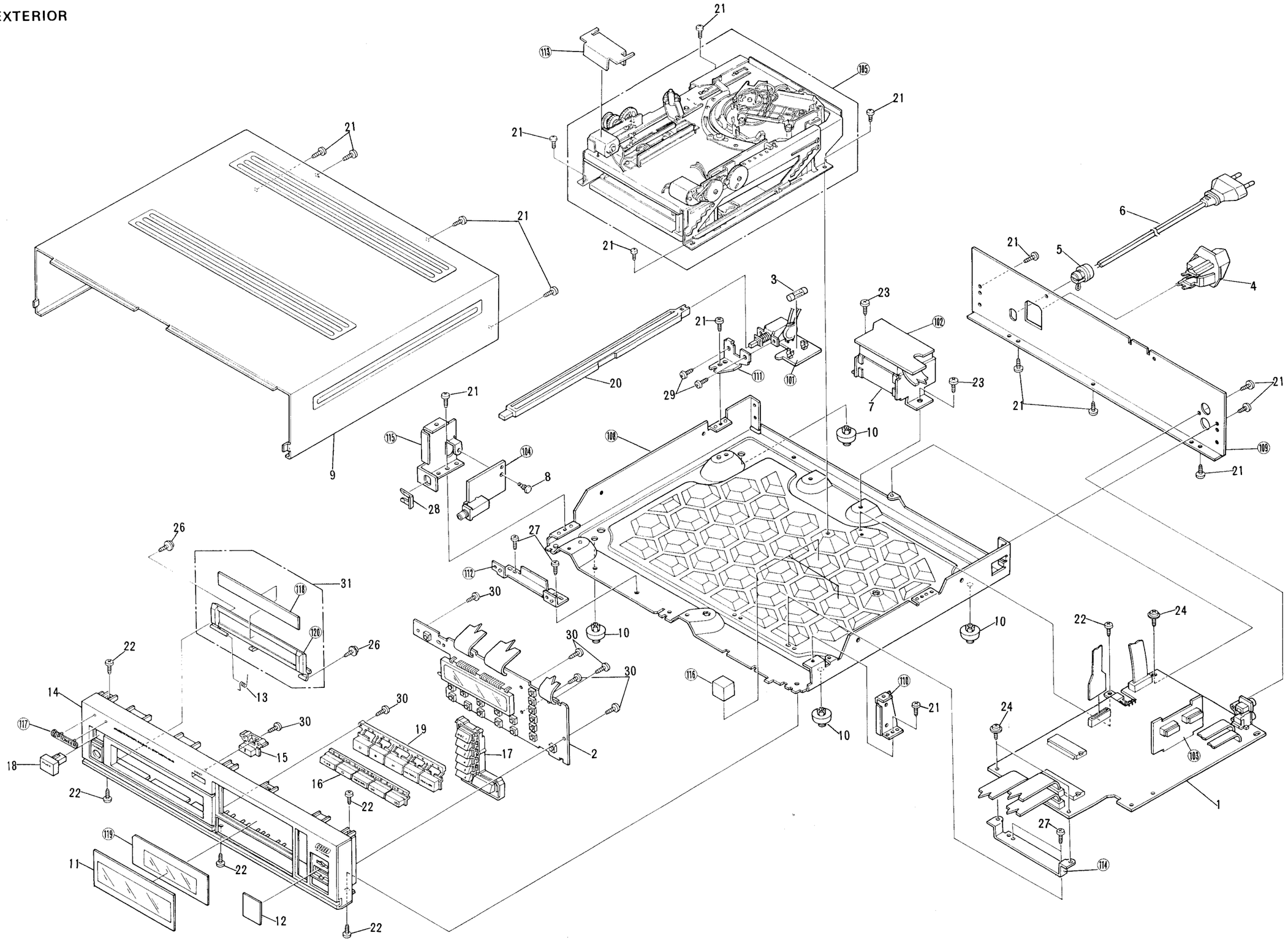
5. EXPLODED VIEWS AND PARTS LIST

5.1 EXTERIOR



5. EXPLODED VIEWS AND PARTS LIST

5.1 EXTERIOR



NOTES:

- *Parts without part number cannot be supplied.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

Parts List of Exterior

Mark	No.	Part No.	Description
⚠⊙	1	PWZ1399	Main board assembly
⊙	2	PWZ1410	Function board assembly
⚠ ★★	3	REK-103	Fuse (2A)
⚠	4	AKP-508	1P AC outlet
⚠	5	CM-22B	Strain relief
⚠	6	PDG1003	AC power cord
⚠ ★	7	PTT1059	Power transformer (AC220/240V)
	8	PBM-012	Plastic rivet
	9	PNA1154	Bonnet
	10	REC-434	Leg assembly
	11	PAM1178	Window
	12	PAM1180	Name plate (Door)
	13	PBH1022	Door spring
	14	PNW1359	Function panel
	15	PAC1149	Eject button
	16	PAC1238	Mode button
	17	PAC1239	Disc button
	18	PAC1240	Power button
	19	PAC1257	Function button
	20	PNY-528	Power SW joint
	21	BBZ30P080FCC	Screw
	22	BBZ30P080FZK	Screw
	23	BBZ40P060FCC	Screw
	24	IBZ30P060FCC	Screw
	25	.....	.....
	26	IPZ30P060FMC	Screw
	27	PCZ30P050FZK	Screw
	28	PEC-107	Binder
	29	PMZ30P060FMC	Screw
	30	PPZ30P100FMC	Screw
	31	PYY1059	Door assembly
	101		Power switch board assembly
	102		Transformer board assembly
	103		DAC board assembly
	104		Headphone board assembly
	105		Multi mechanism assembly
	106		Button sheet
	107		Absorber
	108		Base
	109		Rear panel
	110		Angle
	111		Switch angle
	112		Angle (P)
	113		Shield plate (M)
	114		P.C.B. angle
	115		Front angle
	116		Cushion
	117		Name plate
	118		Door name plate
	119		FL filter
	120		Door

5.2 MECHANISM SECTION

Parts List of Mechanism Section

Mark	No.	Part No.	Description
★★	1.	PEB1015	Belt
	2.	PNB1028	Stair (L)
	3.	PNB1138	Stair (R)
	4.	PNW1095	Gear pulley
	5.	PNW1096	Gear
	6.	PNW1097	Gear
	7.	PNW1122	Gear
	8.	PNW1098	Idler gear
	9.	PBH-465	Eject spring
	10.	PBH1014	Lock spring
	11.	PBH1015	SW spring
	12.	PBH1018	Stair spring
	13.	PBK1009	Drive spring
	14.	PBP-001	Steel ball ϕ4
	15.	PNW1099	Rack
	16.	PNW1253	Drive plate
	17.	PNW1101	Operation plate
	18.	PNW1102	Top guide
	19.	PNW1395	Lock lever
	20.	PNY-386	Roller
	21.	PXC-016	Damper assembly
	22.	PBA-125	Screw
	23.	PBA1002	Screw
	24.	PBH1016	Clamper spring (T)
	25.	PBH1017	Clamper spring (B)
	26.	PEB1014	Float rubber
	27.	PED1001	Cushion (A)
	28.	PED1002	Cushion (B)
	29.	PNW1068	Clamper
	30.	PNW1105	Rotary lever
	31.	PNW1106	Clamper cam
	32.	PNW1107	Clamper holder (T)
★★	33.	PYY1025	Motor assembly (CARRIAGE, LOADING, DISC SELECT)
	34.	PNW1108	Clamper holder (B)
	35.	PNW1110	Pressure cam
	36.	PNW1111	Upper tray
	37.	PYY1027	Disc table assembly
	38.	BBZ20P080FMC	Screw
	39.	PXM1002	Motor
	40.	BBZ30P060FMC	Screw
	41.	PCZ30P040FMC	Screw
	42.	PEC-107	Binder
	43.	PMZ20P030FMC	Screw
	44.	PPZ30P080FMC	Screw
	45.	WA30F120M100	Washer
	46.	WA31D054D050	Washer
	47.	WT12D032D025	Washer
	48.	WT25D047D025	Washer
	49.	WT31D054D025	Washer
	50.	.....	.....
	51.	CGDYX104M25	Ceramic capacitor
	52.	PBA-209	Screw
	53.	PBH1008	Drive spring
	54.	PBK1010	Spring
★★	55.	PEB1072	Belt
	56.	PLA1003	Drive screw
	57.	PLA1004	Guide bar
	58.	PNW1062	Chassis
	59.	PNW1063	Carriage plate
	60.	PNW1066	Pully
★★	61.	PSH1003	Slide switch (INSIDE)
★★	62.	PXM1001	Spindle motor
	63.	PWY1007	Pick up assembly
	64.	BPZ20P080FZK	Screw
	65.	PMZ20P030FMC	Screw
	101.		Main chassis
	102.		Gear angle (L)
	103.		Gear angle (R)
	104.		Lever
	105.		SM select
	106.		Eject lever
	107.		Drive lever
	108.		Bottom guide
	109.		Sub chassis
	110.		Upper chassis
	111.		Upper guide
	112.		Switch board assembly
	113.		Select board assembly
	114.		Base plate
	115.		Carriage motor board
	116.		Servo mechanism assembly
	117.		Roller

tion

c capacitor

pring

crew
bar
ge plate

witch (INSIDE)
e motor
o assembly

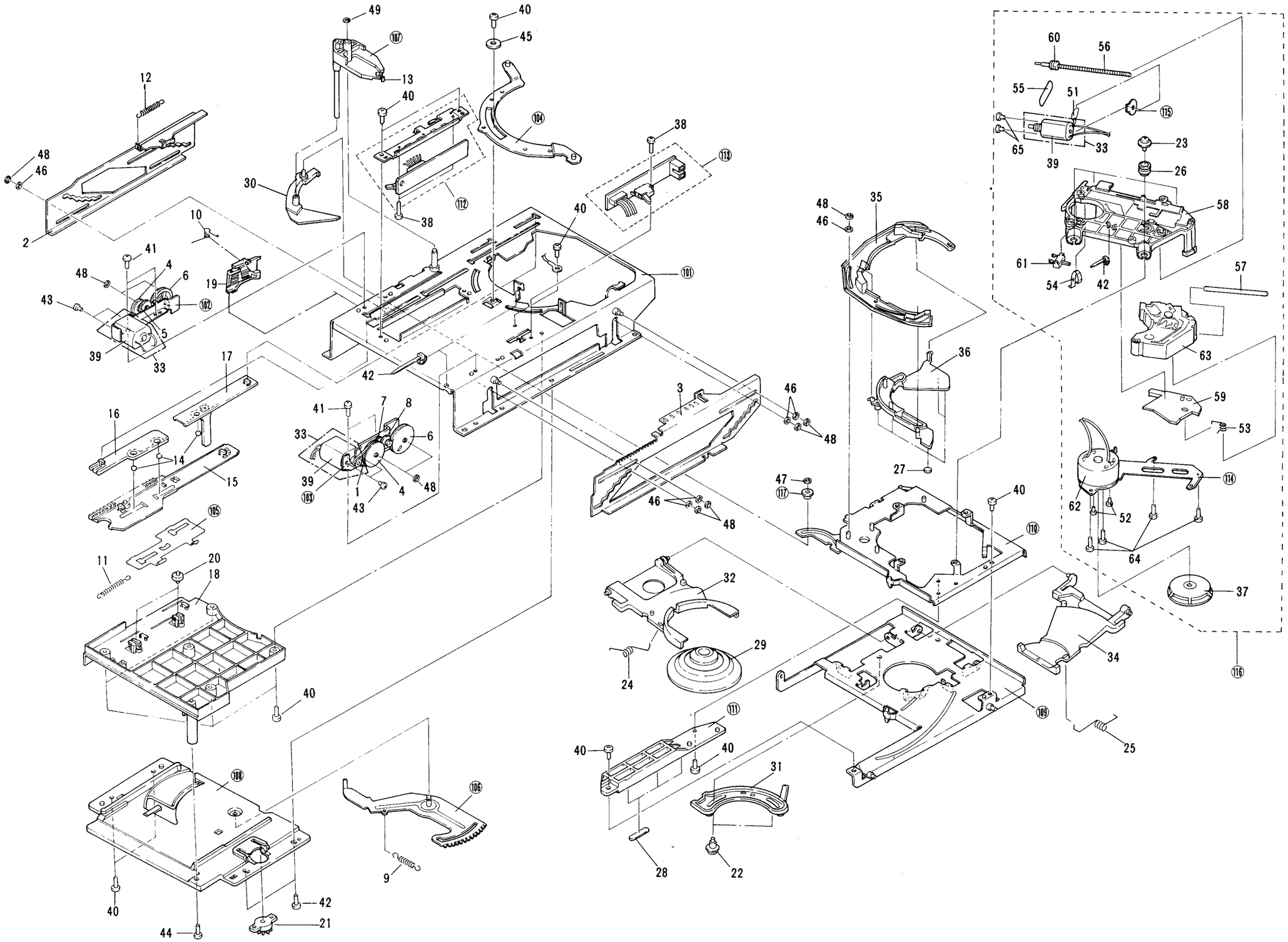
hassis
ngle (L)
ngle (R)

act

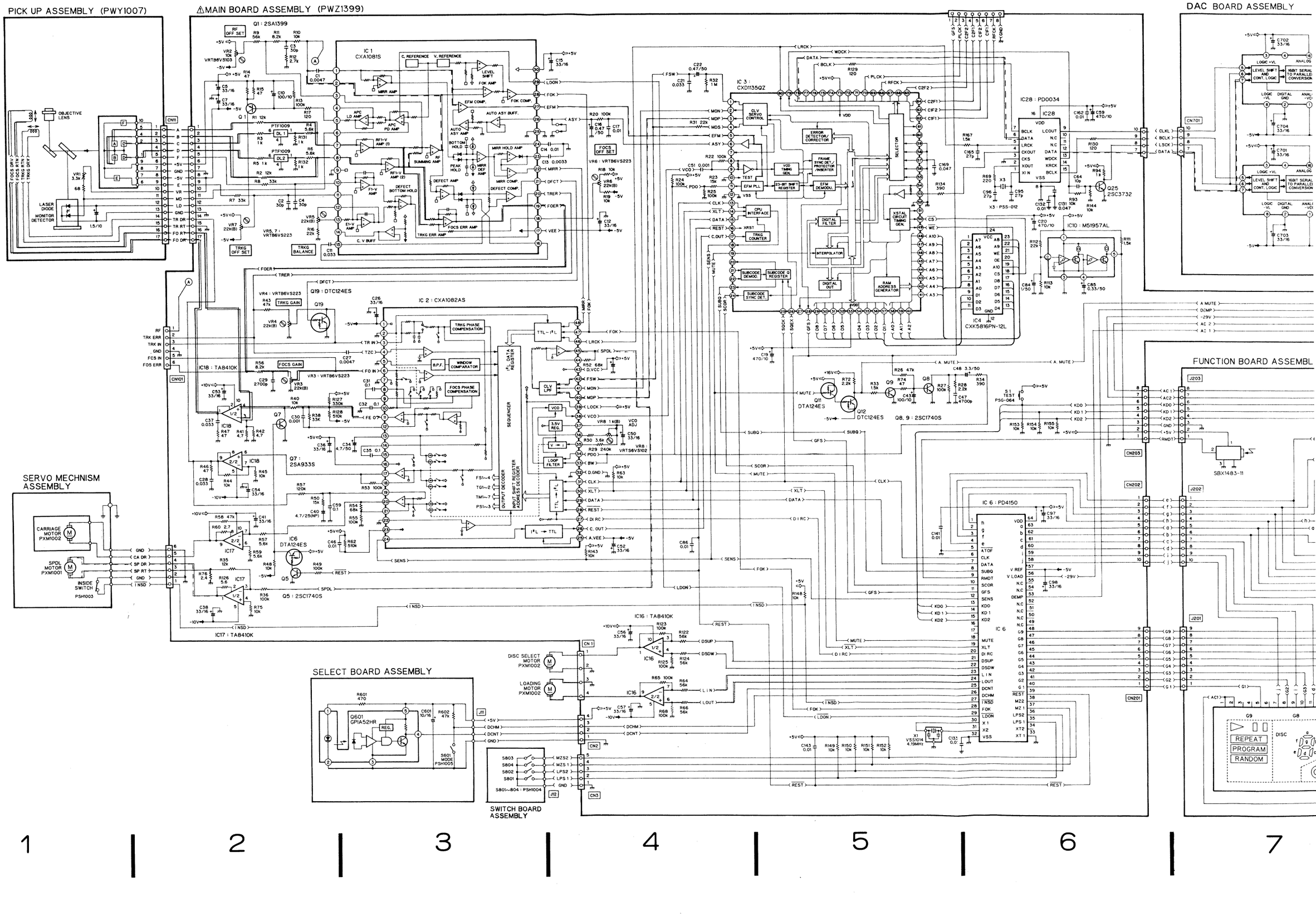
ever
ever
n guide
assis
chassis

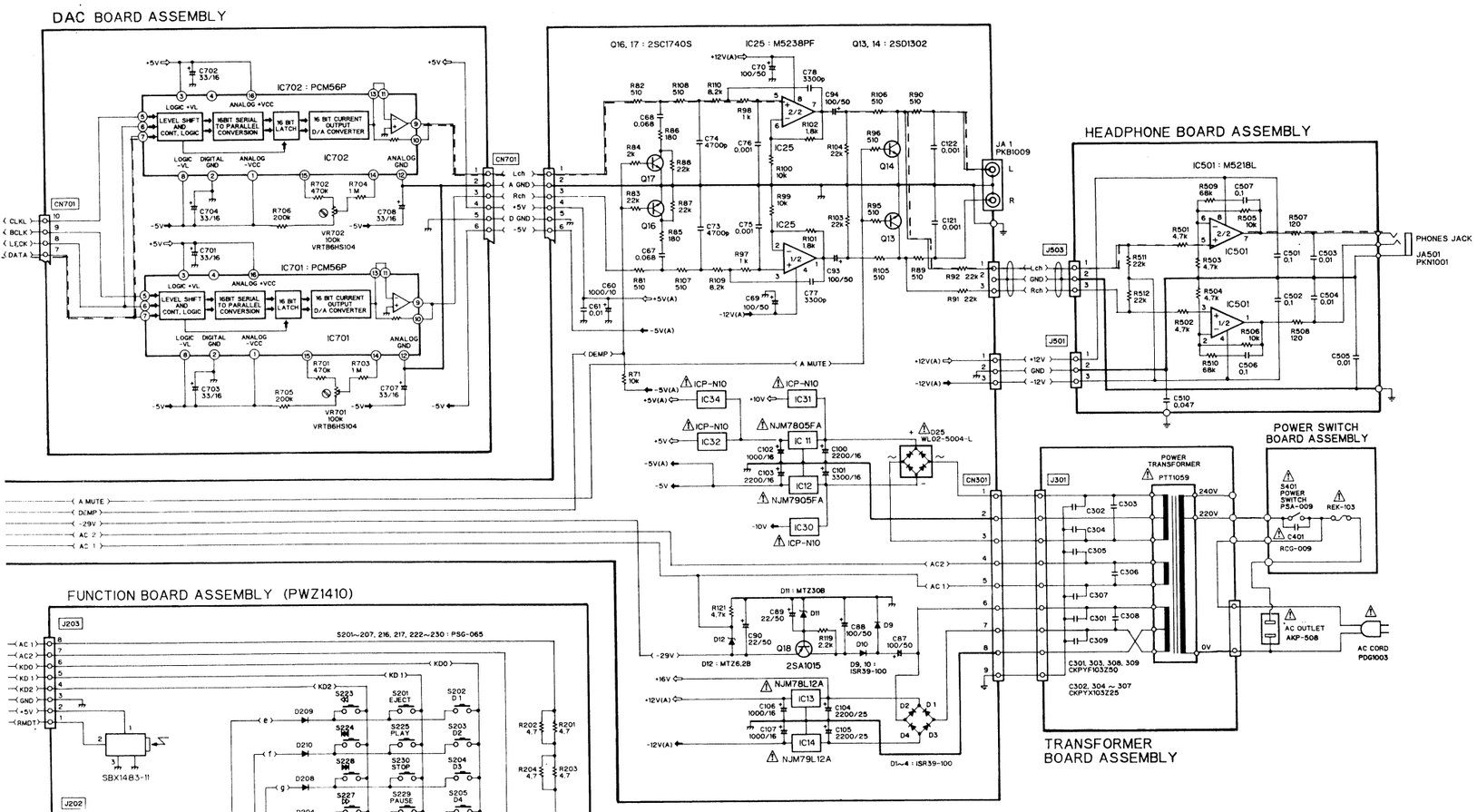
guide
board assembly
oard assembly
ate
e motor board

nechanism assembly



6. SCHEMATIC DIAGRAM





NOTE:

1. RESISTORS:
   Indicated in Ω, 1/8W & 1/4W, ±5% tolerance unless otherwise noted k; kΩ, M; MΩ, (F); ±1%, (G); ±2%, (K); ±10%, (M); ±20% tolerance

2. CAPACITORS:
   Indicated in capacity (μF)/voltage (V) unless otherwise noted p; pF. Indication without voltage is 50V except electrolytic capacitor.

3. VOLTAGE, CURRENT:
   ▭; DC voltage (V) at no input signal
   Value in ( ) is DC voltage at rated power.
   mA; DC current at no input signal

4. OTHERS:
   ➡; Signal route.
   ⊘; Adjusting point.

   The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
   * marked capacitors and resistors have parts numbers.
   The underlined indicates the switch position.

   This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

5. SWITCHES : (The underlined indicates the switch position)
   OUTSIDE OF P.C. BOARD ASSEMBLY
   S : INSIDE SWITCH ON – OFF
   MAIN BOARD ASSEMBLY
   S1 : TEST MODE SWITCH ON – OFF
   FUNCTION BOARD ASSEMBLY
   S201 : EJECT SWITCH
   S202 : 1 (DISC NO.) SWITCH
   S203 : 2 (DISC NO.) SWITCH
   S204 : 3 (DISC NO.) SWITCH
   S205 : 4 (DISC NO.) SWITCH
   S206 : 5 (DISC NO.) SWITCH
   S207 : 6 (DISC NO.) SWITCH
   S216 : TIME
   S217 : PROGRAM MEMORY SWITCH
   S222 : REPEAT SWITCH
   S223 : ◁◁ (MANUAL SEARCH) SWITCH
   S224 : |◀◀ (TRACK SEARCH) SWITCH
   S225 : PLAY SWITCH
   S226 : RANDOM PLAY SWITCH
   S227 : ▷▷ (MANUAL SEARCH) SWITCH
   S228 : ▶▶| (TRACK SEARCH) SWITCH
   S229 : PAUSE SWITCH
   S230 : STOP SWITCH
   POWER SWITCH BOARD ASSEMBLY
   S401 : POWER SWITCH ON – OFF
   SELECT BOARD ASSEMBLY
   S601 : DISC SELECTOR SWITCH (HOME POSITION SWITCH) ON – OFF (HOME POSITION-OUTSIDE OF HOME POSITION)

SWITCH BOARD ASSEMBLY
S801 : LPS1 LOADING POSITION
S802 : LPS2

	STOP	DURING THE LOADING	CLAMP CONDITION PLAY	DURING THE EJECT
S801	ON (H)	OFF (L)	OFF (L)	ON (H)
S802	ON (H)	ON (H)	OFF (L)	OFF (L)

S803 : MZS2 MAGAZINE
S804 : MZS1

	NO MAGAZINE	SIX MAGAZINES	SINGLE
S803	ON (H)	OFF (L)	OFF (L)
S804	OFF (L)	ON (H)	OFF (L)

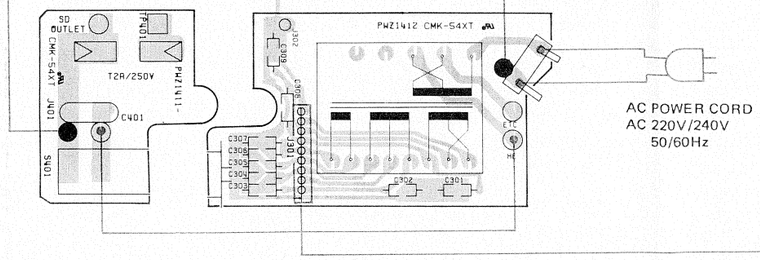
Focus servo loop
Signal route
Tracking servo loop
Carriage servo loop
Disc select motor route
Loading motor route
Spindle motor route

7. P.C. BOARDS CONNECTION DIAGRAM

AC OUTLET

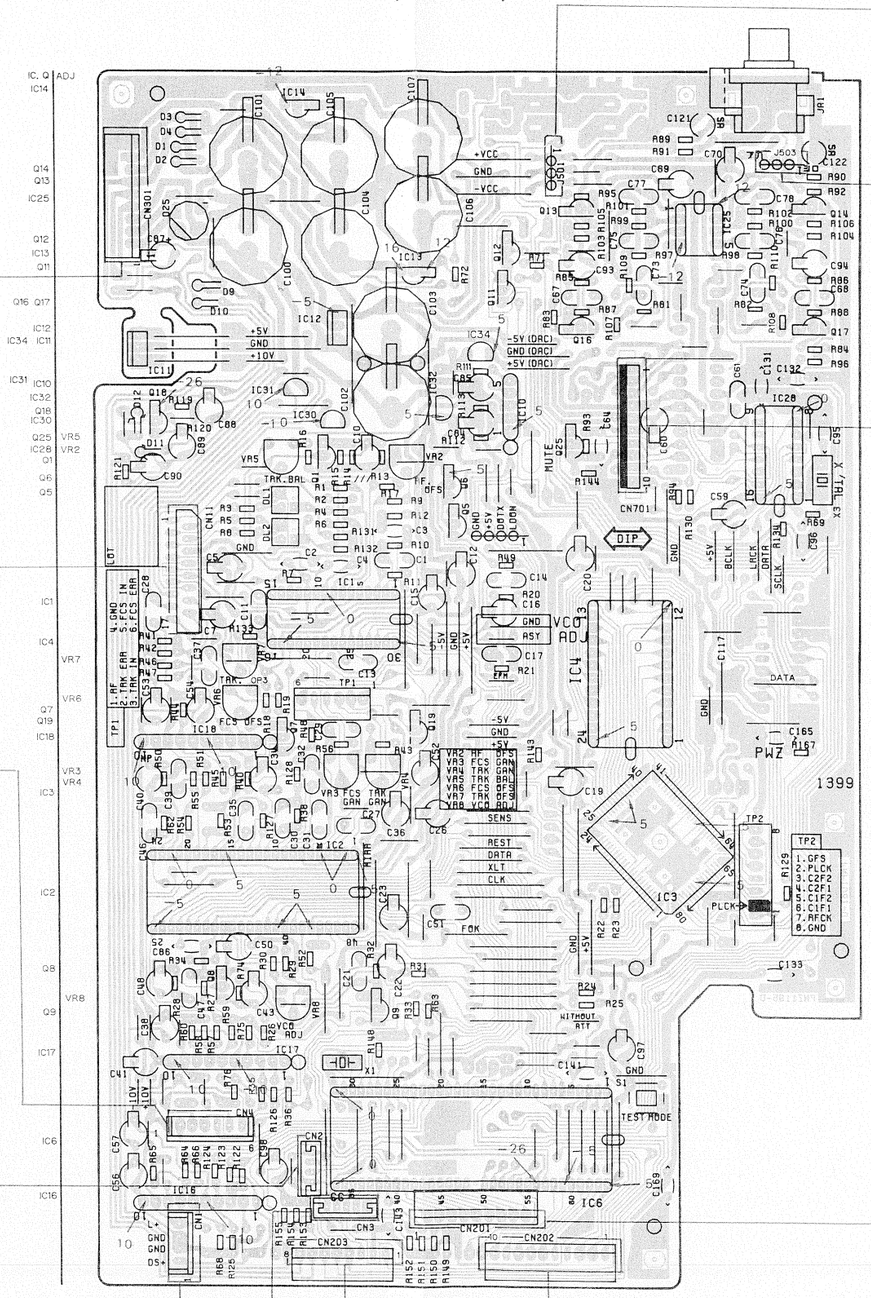
TRANSFORMER BOARD ASSEMBLY

POWER SWITCH BOARD ASSEMBLY

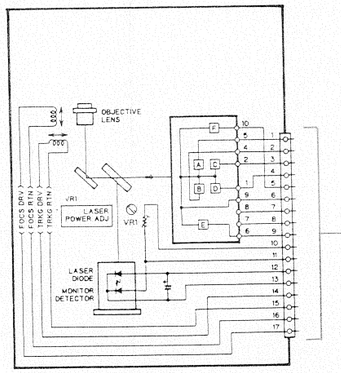


AC POWER CORD
AC 220V/240V
50/60Hz

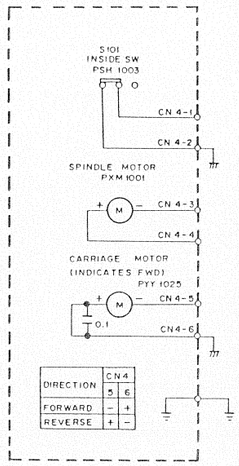
⚠ MIAN BOARD ASSEMBLY (PWZ1399)



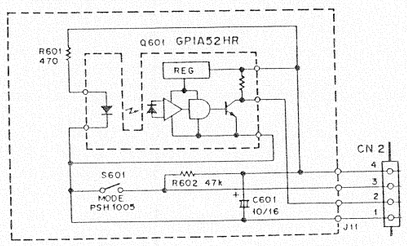
PICK-UP ASSEMBLY (PWY1007)

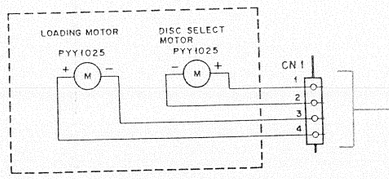


SERVO MECHANISM ASSEMBLY

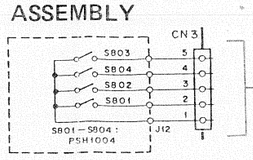


SELECT BOARD ASSEMBLY

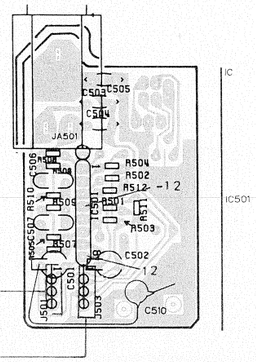




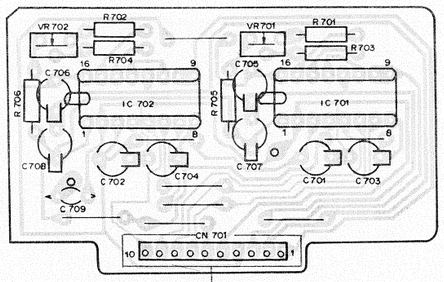
SWITCH BOARD ASSEMBLY

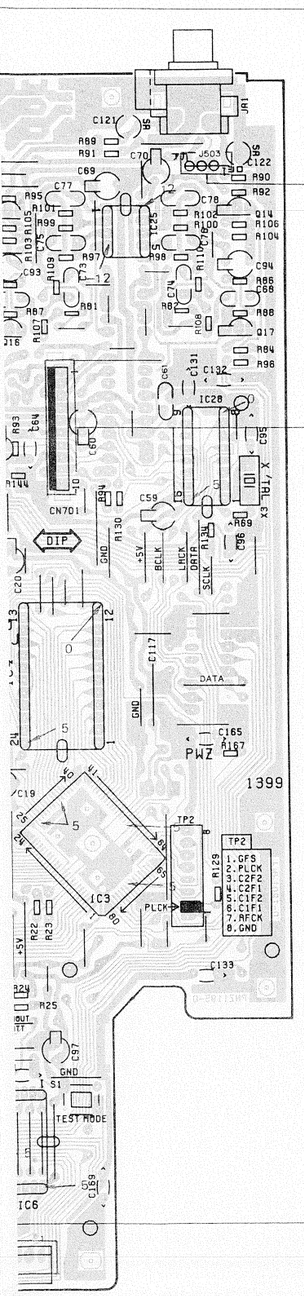


HEADPHONE BOARD ASSEMBLY

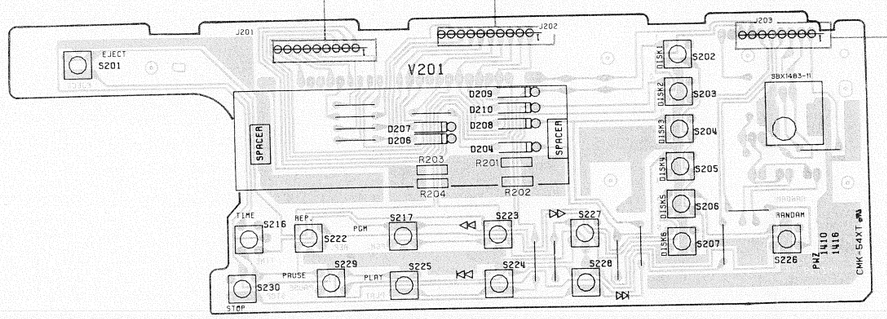


DAC BOARD ASSEMBLY



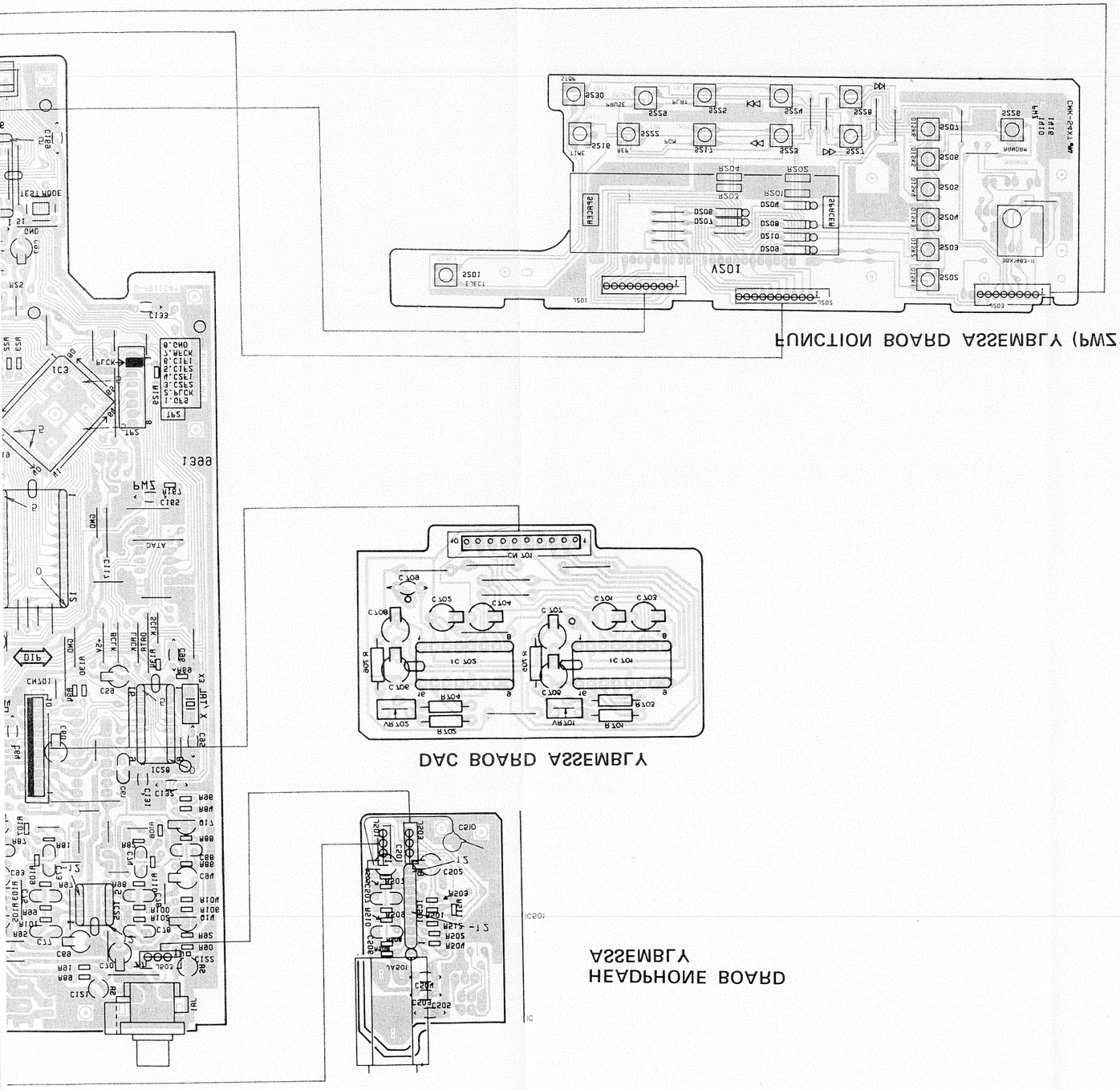


FUNCTION BOARD ASSEMBLY (PWZ1410)



P.C.B. pattern diagram indication	Corresponding part symbol	Part name	P.C.B. pattern diagram indication	Corresponding part symbol	Part name
		Transistor			Ceramic capacitor
					Mylar capacitor
D S G		FET	SR		Styrol capacitor
			SF		
		Diode	NP		Electrolytic capacitor (Non polarized)
			NL		Electrolytic capacitor (Noiseless)
		Zenner diode		+	Electrolytic capacitor (Polarized)
		LED			Electrolytic capacitor (Polarized)
		Varactor			Power capacitor
		Tact switch			Semi-fixed resistor
		Inductor			Resistor array
					Resistor
		Coil			
		Transformer			Resonator
		Filter			

1. This P.C.B. connection diagram is viewed from the parts mounted side.
2. The parts which have been mounted on the board can be replaced with those shown with the corresponding wiring symbols listed in the above Table.
3. The capacitor terminal marked with ▭ shows negative terminal.
4. The diode marked with O shows cathode side.
5. The transistor terminal marked with ▭ shows emitter.



FUNCTION BOARD ASSEMBLY (PWZ1410)

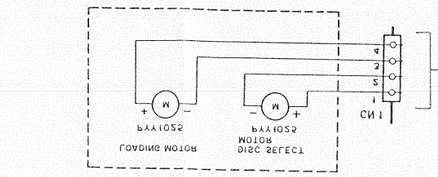
DAC BOARD ASSEMBLY

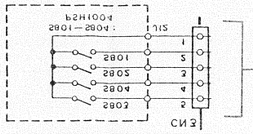
ASSEMBLY
HEADPHONE BOARD

This P.C.B. connection diagram is viewed from the foil side.

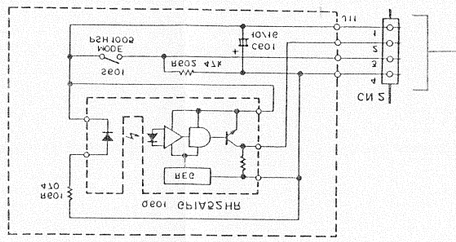
MODEL PD-X4700

1 2 3 4 5 6 7 8

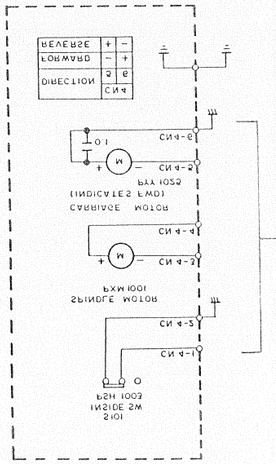




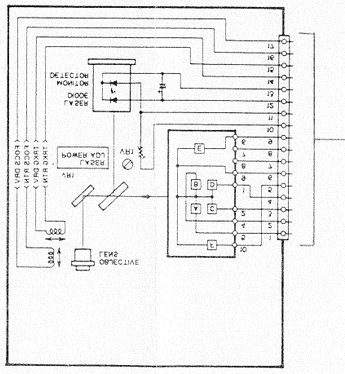
ASSEMBLY
SWITCH BOARD



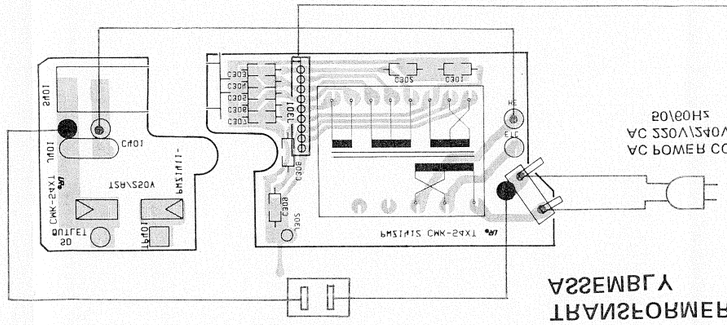
SELECT BOARD ASSEMBLY



ASSEMBLY
SERVO MECHANISM

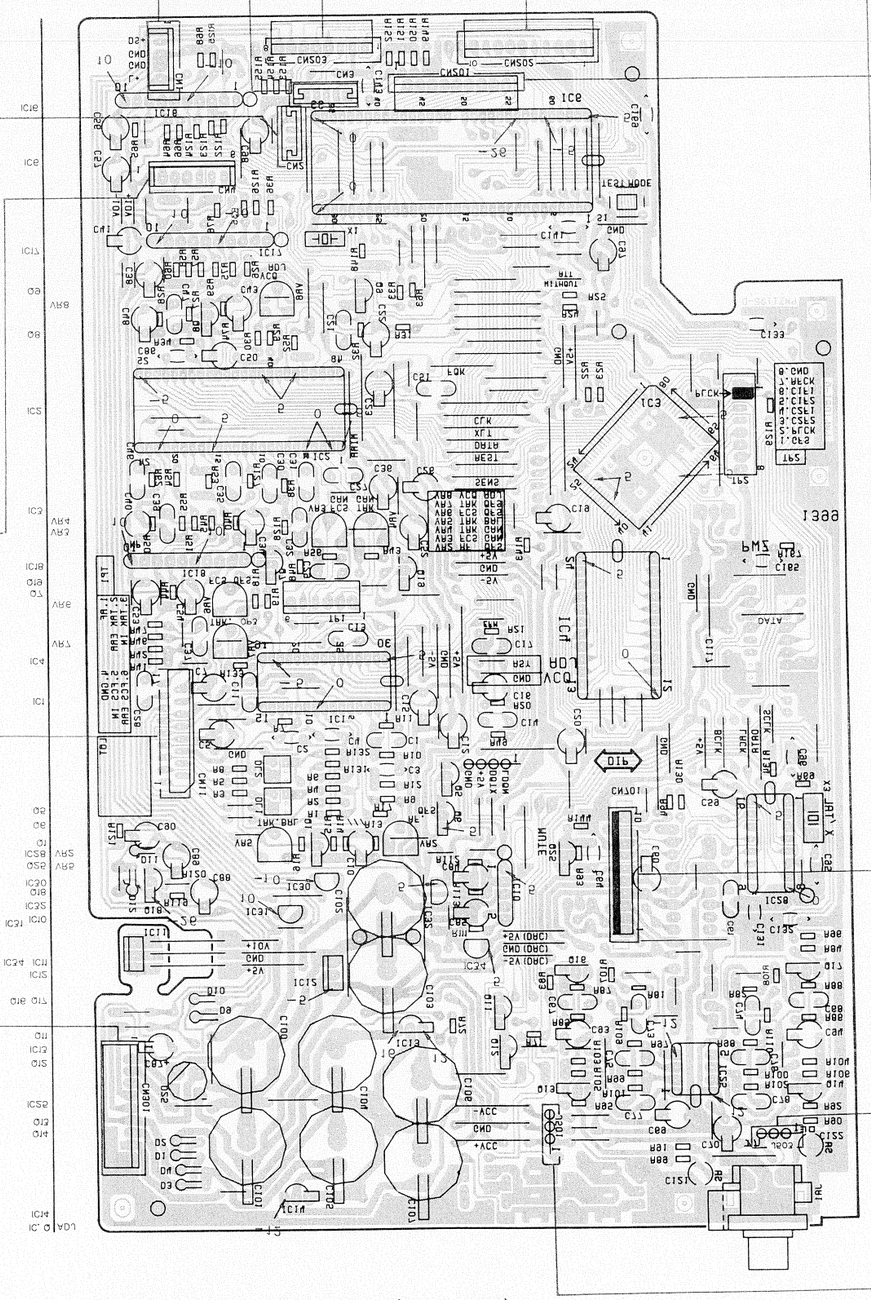


PICK-UP ASSEMBLY (PWY1001)



ASSEMBLY
POWER SWITCH BOARD

ASSEMBLY
TRANSFORMER BOARD

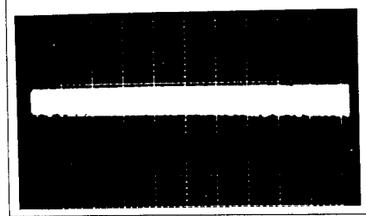


MAIN BOARD ASSEMBLY (PWZ1398)

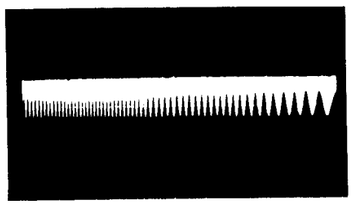
WAVEFORMS

NOTE: The encircled numbers denote measuring points in the circuit and pattern diagrams.

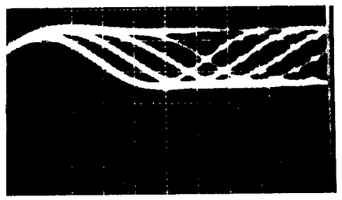
① CN11-5 Pin : PLAY MODE
100mV/div 5m sec/div



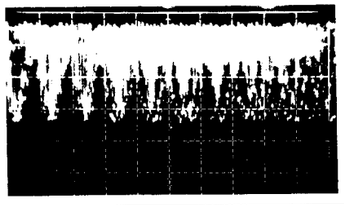
① CN11-5 Pin: SEARCH MODE
100mV/div 5m sec/div



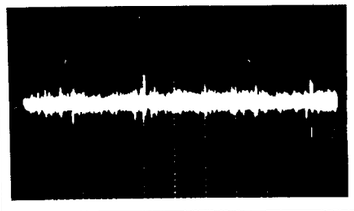
② TP1-1 Pin: PLAY
1V/div 200n sec/div



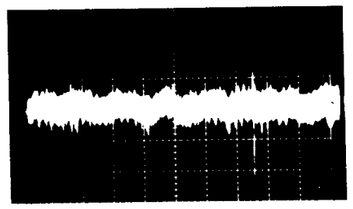
② TP1-1 Pin: SEARCH
500mV/div 5m sec/div



③ TP1-6 Pin: PLAY
500mV/div 10m sec/div



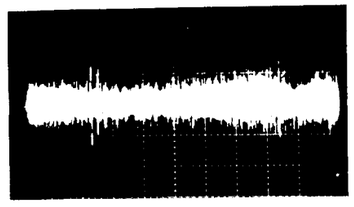
③ TP1-6 Pin: SEARCH
500mV/div 10mS/div



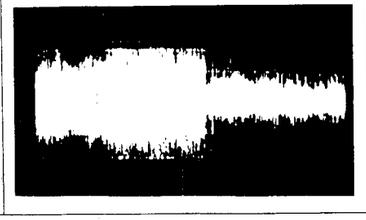
④ TP1-2 Pin: PLAY
1V/div 10mS/div

④ TP1-2 Pin: SEARCH
1V/div 10mS/div

⑤ IC18-1 : PLAY Y
0.2V/div 10mS/div



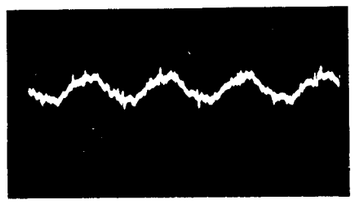
⑤ IC18-1 : PLAY
0.2V/div 10mS/div



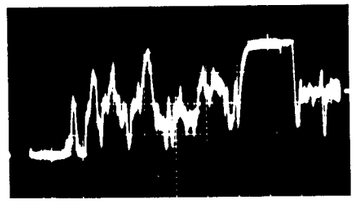
⑥ IC18-9 : PLAY
0.2V/div 10mS/div

⑥ IC18-9 : PLAY
0.2V/div 10mS/div

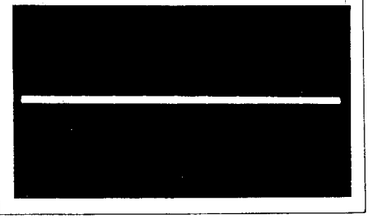
⑦ IC17-1 : PLAY
2V/div 50mS/div



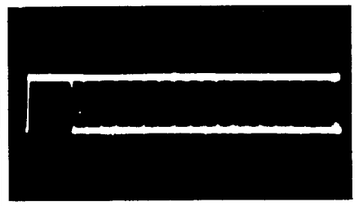
⑦ IC17-1 : SEARCH
2V/div 100mS/div



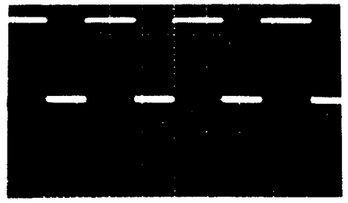
⑧ IC2,33,34 Pin : PLAY
2V/div 10mS/div



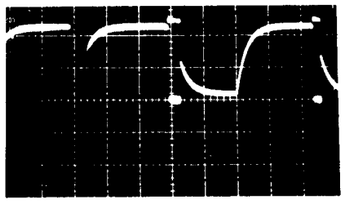
⑨ IC1 27 Pin: PLAY
2V/div 500 μ sec/div



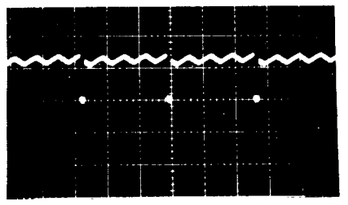
⑩ IC3-4: PLAY
2V/div 50μS/div



⑩ IC3-4: SEARCH
2V/div 100mS/div

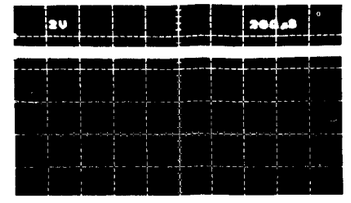


⑪ IC3-3: PLAY
2V/div 200μS/div

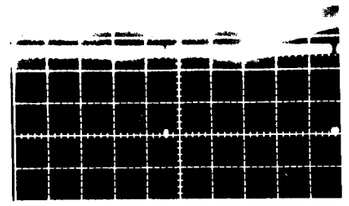


⑪ IC3-3: SEARCH
2V/div 10mS/div

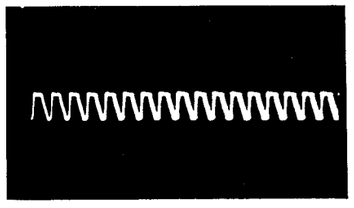
⑫ TP2-1: PLAY
2V/div 200μS/div



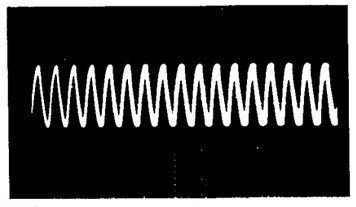
⑫ TP2-1: SEARCH
2V/div 20mS/div



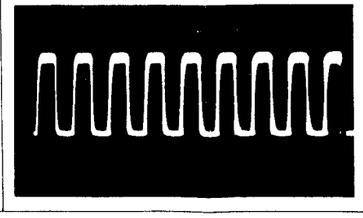
⑬ IC2-38: PLAY
2V/div 200nS/div



⑭ IC3-8: PLAY
2V/div 200nS/div

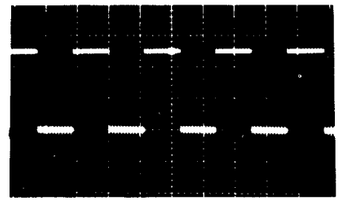


⑮ TP2-2: PLAY
2V/div 200nS/div

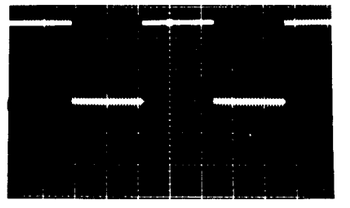


⑯ IC3-76: STOP
2V/div 200nS/div

⑰ IC3-79: STOP
2V/div 5μS/div



⑱ IC3-80: STOP
2V/div 5μS/div



ts in the circuit and

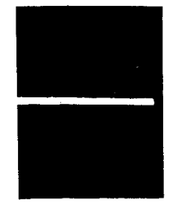
10mS/div

10mS/div

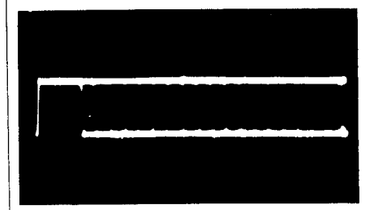
50mS/div

100mS/div

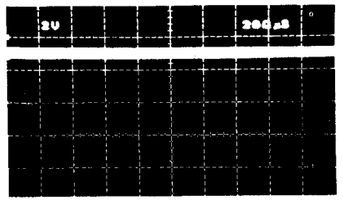
Y
10mS/div



⑨ IC1 27 Pin: PLAY
2V/div 500 μ sec/div

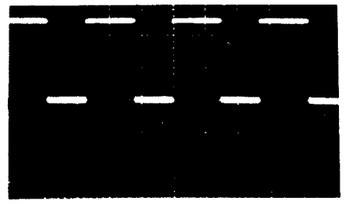


⑫ TP2-1: PLAY
2V/div 200μS/div

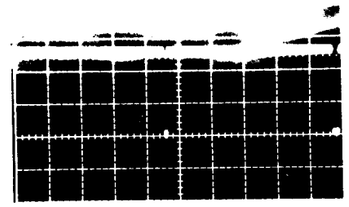


⑯ IC3-76: STOP
2V/div 200nS/div

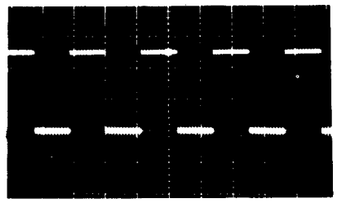
⑩ IC3-4: PLAY
2V/div 50μS/div



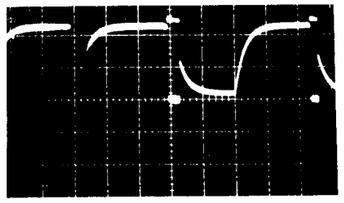
⑫ TP2-1: SEARCH
2V/div 20mS/div



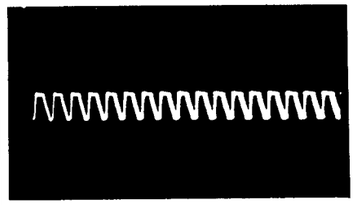
⑰ IC3-79: STOP
2V/div 5μS/div



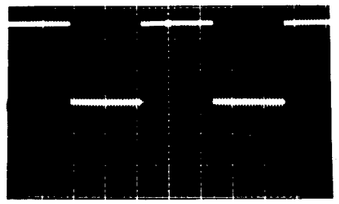
⑩ IC3-4: SEARCH
2V/div 100mS/div



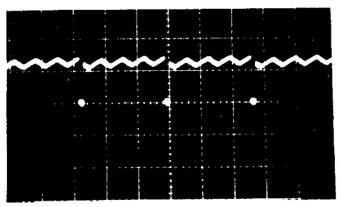
⑬ IC2-38: PLAY
2V/div 200nS/div



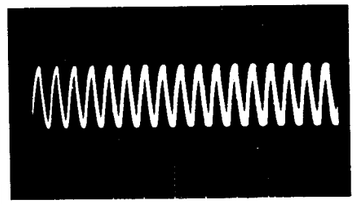
⑱ IC3-80: STOP
2V/div 5μS/div



⑪ IC3-3: PLAY
2V/div 200μS/div

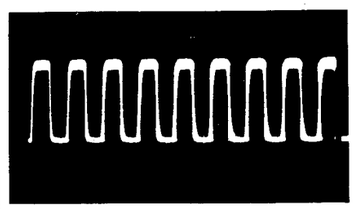


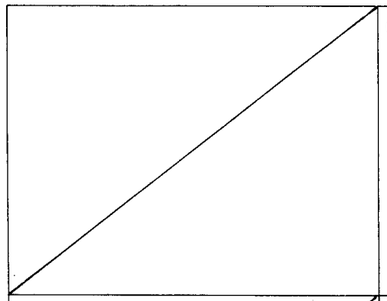
⑭ IC3-8: PLAY
2V/div 200nS/div



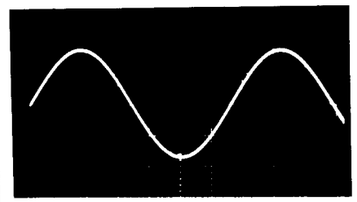
⑪ IC3-3: SEARCH
2V/div 10mS/div

⑮ TP2-2: PLAY
2V/div 200nS/div

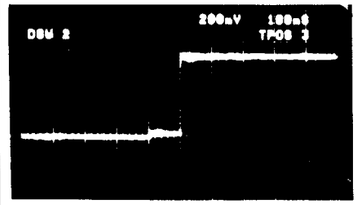




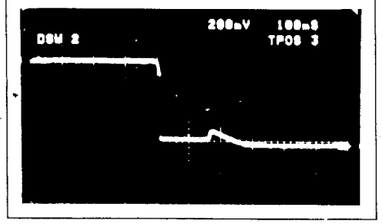
⑲ OUTPUT Lch: PLAY
2V/div 50μS/div



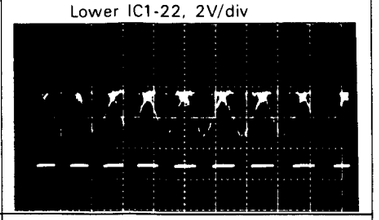
⑳ IC10-5: POWER ON
2V/div 100mS/div

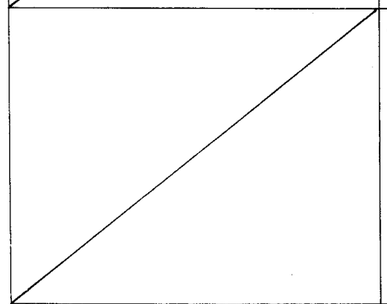


⑳ IC10-5: POWER-OFF
2V/div 100mS/div

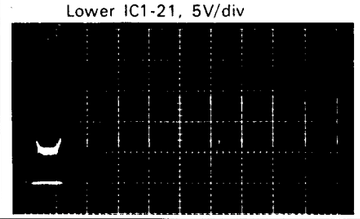


㉑ IC1-22: TR OPEN
1mS/div
Upper TP1-1, 1V/div
Lower IC1-22, 2V/div



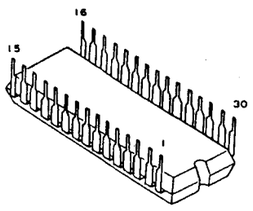


㉒ IC1-21: DFCT
1mS/div
Upper TP1-1, 1V/div
Lower IC1-21, 5V/div

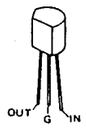


External Appearance of Transistors and Ics

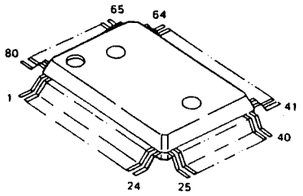
CXA1081S



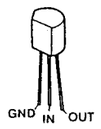
NJM78L12A



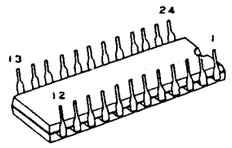
CXD1135QZ



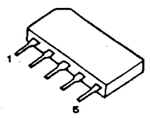
NJM79L12A



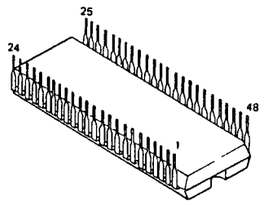
CXK5816PN – 12L
CXK5816PN – 15L
LH5116 – 15



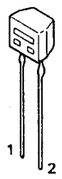
M51957AL



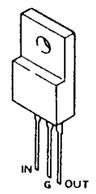
CXA1082AS



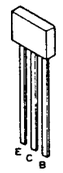
ICP-N10



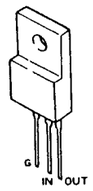
NJM7805FA



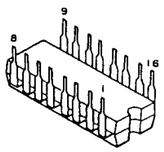
2SC3732



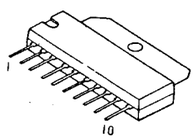
NJM7905FA



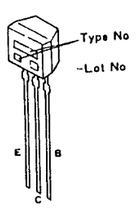
PCM56P
PD0034



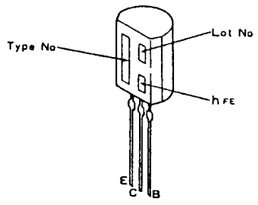
TA8410K



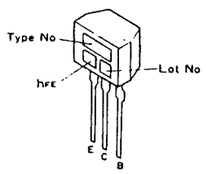
DTA124ES
DTC124ES



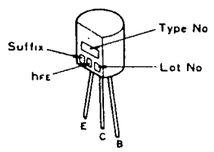
2SA1399



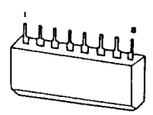
2SC1740S
2SA933S



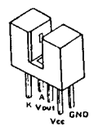
2SD1302



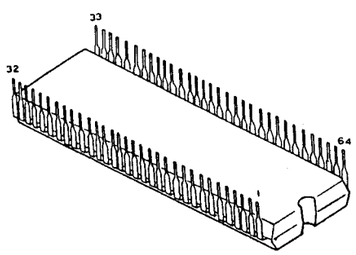
M5218L



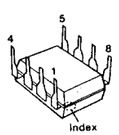
GP1A52HR



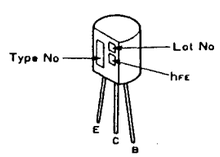
PD4150



M5238PF



2SA1015



8. ELECTRICAL PARTS LIST

NOTES:

- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

  Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω	*56 × 10¹*	*561*	*RD1/4PS 5 6 1 J*
47kΩ	*47 × 10³*	*473*	*RD1/4PS 4 7 3 J*
0.5Ω	*0R5*		*RN2H 0 R 5 K*
1Ω	*010*		*RS1P 0 1 0 K*

  Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ	*562 × 10¹*	*5621*	*RN1/4SR 5 6 2 1 F*

Miscellaneous Parts

P.C. BOARD ASSEMBLIES

Mark	Symbol & Description	Part No.
◉ ⚠	Main board assembly	PWZ1399
◉	Function board assembly	PWZ1410
	Power switch board assembly	
	Transformer board assembly	
	DAC board assembly	
	Headphone board assembly	
	Switch board assembly	
	Select board assembly	

OTHERS

Mark	Symbol & Description	Part No.
	Pick-up assembly	PWY1007
⚠ ★★	Fuse (T2A/250V)	REK-103
⚠	AC outlet (1P)	AKP-508
⚠	Strain relief	CM-22B
⚠	AC power cord	PDG1003
⚠ ★	Power transformer	PTT1059
★★	Motor assembly (DISC SELECT, DISC LOADING, CARRIAGE)	PYY1025
★★	Spindle motor	PXM1001
★★	Slide switch (INSIDE SW)	PSH1003

◉⚠ Main Board Assembly (PWZ1399)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC1	CXA1081S
★★	IC2	CXA1082AS
★★	IC3	CXD1135QZ
★★	IC4	CXK5816PN-12L (CXK5816PN-15L) (LH5116-15)
⚠ ★★	IC30–IC32, IC34	ICP-N10
★★	IC10	M51957AL
★★	IC25	M5238PF
★★	IC13	NJM78L12A
⚠ ★★	IC11	NJM7805FA
★★	IC14	NJM79L12A
⚠ ★★	IC12	NJM7905FA
★★	IC28	PD0034
★★	IC6	PD4150
★★	IC16–IC18	TA8410K
★★	Q6, Q11	DTA124ES
★★	Q12, Q19	DTC124ES
★★	Q1	2SA1399
★★	Q7	2SA933S
★★	Q5, Q8, Q9, Q16, Q17	2SC1740S
★★	Q18	2SA1015
★★	Q25	2SC3732
★★	Q13, Q14	2SD1302
★	D11	MTZ30B (MTZ30C)
★	D12	MTZ6.2B (MTZ6.2C)
⚠ ★	D25	WL02-5004-L
★	D1–D4, D9, D10	1SR139-100

SWITCH

Mark	Symb
★★	S1

CAPACITOR

Mark	Symb
	C95, C64 C2–C C40 C85
	C16, C84 C10, C87, C60
	C106, C89, C101 C100, C104,
	C48 C5, C C38, C97, C19,
	C34 C75, C67, C86, C141,
	C131, C30, C14, C31, C29
	C13, C61 C11, C1, C2 C121,

RESISTORS

Mark	Symb
★	VR2
★	VR3–
★	VR8
	R30

8. ELECTRICAL PARTS LIST

NOTES:

- *Parts without part number cannot be supplied.*
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*
- *The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.*
- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*
  ★★ GENERALLY MOVES FASTER THAN ★
  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *When ordering resistors, first convert resistance values into code form as shown in the following examples.*

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω	*56 × 10¹*	*561*	*RD1/4PS 5 6 1 J*
47kΩ	*47 × 10³*	*473*	*RD1/4PS 4 7 3 J*
0.5Ω	*0R5*		*RN2H 0 R 5 K*
1Ω	*010*		*RS1P 0 1 0 K*

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ	*562 × 10¹*	*5621*	*RN1/4SR 5 6 2 1 F*

Miscellaneous Parts

P.C. BOARD ASSEMBLIES

Mark	Symbol & Description	Part No.
◉ ⚠	Main board assembly	PWZ1399
◉	Function board assembly	PWZ1410
	Power switch board assembly	
	Transformer board assembly	
	DAC board assembly	
	Headphone board assembly	
	Switch board assembly	
	Select board assembly	

OTHERS

Mark	Symbol & Description	Part No.
	Pick-up assembly	PWY1007
⚠ ★★	Fuse (T2A/250V)	REK-103
⚠	AC outlet (1P)	AKP-508
⚠	Strain relief	CM-22B
⚠	AC power cord	PDG1003
⚠ ★	Power transformer	PTT1059
★★	Motor assembly (DISC SELECT, DISC LOADING, CARRIAGE)	PYY1025
★★	Spindle motor	PXM1001
★★	Slide switch (INSIDE SW)	PSH1003

◉⚠ Main Board Assembly (PWZ1399)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC1	CXA1081S
★★	IC2	CXA1082AS
★★	IC3	CXD1135QZ
★★	IC4	CXK5816PN-12L (CXK5816PN-15L) (LH5116-15)
⚠ ★★	IC30–IC32, IC34	ICP-N10
★★	IC10	M51957AL
★★	IC25	M5238PF
★★	IC13	NJM78L12A
⚠ ★★	IC11	NJM7805FA
★★	IC14	NJM79L12A
⚠ ★★	IC12	NJM7905FA
★★	IC28	PD0034
★★	IC6	PD4150
★★	IC16–IC18	TA8410K
★★	Q6, Q11	DTA124ES
★★	Q12, Q19	DTC124ES
★★	Q1	2SA1399
★★	Q7	2SA933S
★★	Q5, Q8, Q9, Q16, Q17	2SC1740S
★★	Q18	2SA1015
★★	Q25	2SC3732
★★	Q13, Q14	2SD1302
★	D11	MTZ30B (MTZ30C)
★	D12	MTZ6.2B (MTZ6.2C)
⚠ ★	D25	WL02-5004-L
★	D1–D4, D9, D10	1SR139-100

SWITCH

Mark	Symbol & Description		Part No.
★★	S1	Tact switch	PSG-064

CAPACITORS

Mark	Symbol & Description	Part No.
	C95, C96, C165	CCCCH270J50
	C64	CCCCH100D50
	C2–C4	CCCCH300J50
	C40	CEANP4R7M25
	C85	CEASR33M50
	C16, C22	CEASR47M50
	C84	CEAS010M50
	C10, C43	CEAS101M10
	C87, C88, C69, C70	CEAS101M50
	C60	CEAS102M10
	C106, C107, C102	CEAS102M16
	C89, C90, C93, C94	CEAS220M50
	C101	CEAS332M16
	C100, C103	CEAS222M16
	C104, C105	CEAS222M25
	C48	CEAS3R3M50
	C5, C7, C12, C15, C23, C26, C36, C38, C41, C50, C52–C54, C56, C57 C97, C98	CEAS330M16
	C19, C20, C59	CEAS471M10
	C34	CEAS4R7M50
	C75, C76	CQMA102J50
	C67, C68	CQMA683J50
	C86, C133, C143, C132, C141, C162	CKCYF103Z50
	C131, C169	CKCYF473Z50
	C30, C51	CQMA102K50
	C14, C17, C46	CQMA103K50
	C31, C32, C35, C39	CQMA104K50
	C29	CQMA272J50
	C13, C77, C78	CQMA332J50
	C61	CFTXA103J50
	C11, C21, C28, C37	CQMA333K50
	C1, C27, C47, C73, C74	CQMA472J50
	C121, C122	CQSA102J50

RESISTORS

Mark	Symbol & Description		Part No.
★	VR2	Semi-fixed resistor (10 kΩ)	VRTB6VS103
★	VR3–VR7	Semi-fixed resistor (22 kΩ)	VRTB6VS223
★	VR8	Semi-fixed resistor (2.2 kΩ)	VRTS6VS102
	R30	Metal film resistor	RN1/6PQ3601F
		Other resistors	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description		Part No.
★	X3	Crystal resonator	PSS-012
★	X1	Ceramic resonator	VSS1014
	DL1, DL2	Delay line	PTF1012 (PTF1009)
	JA1	2P pin jack	PKB1009

Power Switch Board Assembly

SWITCH

Mark	Symbol & Description		Part No.
⚠ ★★	S401	Power switch	PSA-009

CAPACITOR

Mark	Symbol & Description	Part No.
⚠	C401	RCG-009 (VCG-044)

Transformer Board Assembly

CAPACITORS

Mark	Symbol & Description	Part No.
	C301, C303, C308, C309	CKPYF103Z50
	C302, C304–C307	CKPYX103N25

Headphone Board Assembly

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
★★	IC501	M5218L

CAPACITORS

Mark	Symbol & Description	Part No.
	C503–C505	CKCYF103Z50
	C501, C502, C506, C507	CQMA104K50
	C510	CKCYF473Z50

RESISTORS

Mark	Symbol & Description	Part No.
	R501–512	RD1/6PM□□□J

OTHERS

Mark	Symbol & Description		Part No.
	JA501	Jack (PHONES)	PKN1001

⊙ Function Board Assembly (PWZ1410)

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★	D204, D206–D210	1SS254

SWITCHES

Mark	Symbol & Description	Part No.
★★	S201–S207, S216, S217, S222–S230 Tact switch	PSG-065

RESISTORS

Mark	Symbol & Description	Part No.
	R201–R204	RD1/4PM4R7J

OTHERS

Mark	Symbol & Description		Part No.
	V201	Fluorescent indicator tube	PEL1022
		Remote control reception	SBX1483

Switch Board Assembly

SWITCHES

Mark	Symbol & Description		Part No.
★★	S801–S804	Slide switch (LOADING POSITION, MAGAZINE)	PSH1004

Select Board Assembly

SEMICONDUCTOR

Mark	Symbol & Description	Part No.
★★	Q601	GP1A52HR

SWITCH

Mark	Symbol & Description		Part No.
★★	S601	Slide switch (MODE)	PSH1005

CAPACITOR

Mark	Symbol & Description	Part No.
	C601	CEAL100M16

RESISTORS

Mark	Symbol & Description	Part No.
	All resistors	RD1/6PM□□□J

DAC Board Assembly

SEMICONDUCTORS

Mark	Symbol & Description	Part No.
★★	IC701, IC702	PCM56P

CAPACITORS

Mark	Symbol & Description	Part No.
	C701–C704, C707, C708	CEAS330M16

RESISTORS

Mark	Symbol & Description	Part No.
★	VR701, VR702 Semi-fixed resistor	VRTB6HS104
	R701–R707	RD1/4PM□□□J

9. ADJUSTMENTS

The adjustment items of this model should be performed in the order as shown below.

• Adjustment and check Items

1. Tracking offset. focus offset and RF offset adjustments
2. RF level adjustment
3. LD (Laser Diode) output power confirmation
4. Focus lock and spindle lock confirmation
5. Grating adjustment
6. Tracking balance adjustment
7. Tangential adjustment
8. Focus gain adjustment
9. Tracking gain adjustment
10. VCO free-run frequency adjustment
11. Method to confirm S character (FOCUS ERROR)
12. MSB adjustment

• Measuring Equipment

1. Dual trace oscilloscope
2. Laser power meter
3. Test disc (YEDS7)
4. Tracking balance adjustment filter
5. Loop gain adjustment filter
6. Signal generator
7. Frequency counter
8. Other general tools

• Test Mode

All the adjustments should be performed in Test Mode.

Test Mode setting and cancellation procedures

(1) To set the Test Mode, turn the POWER switch of the player (S401) ON pushing the TEST MODE SWITCH (S1).
(2) To canacel the Test Mode, simply turn the POWER switch of the player OFF.

The various key functions in the Test Mode are listed in Table 9-1.

• Adjusting Points

VR1: Laser power
VR7: Tracking offset (TRK.OFS)
VR3: Focus gain (FCS.GAN)
VR4: Tracking gain (TRK.GAN)
VR5: Tracking balance (TRK.BAL)
VR6: Focus offset (FCS.OFS)
VR8: VCO adjustment (VCO.ADJ)
VR2: RF offset (RF.OFS)

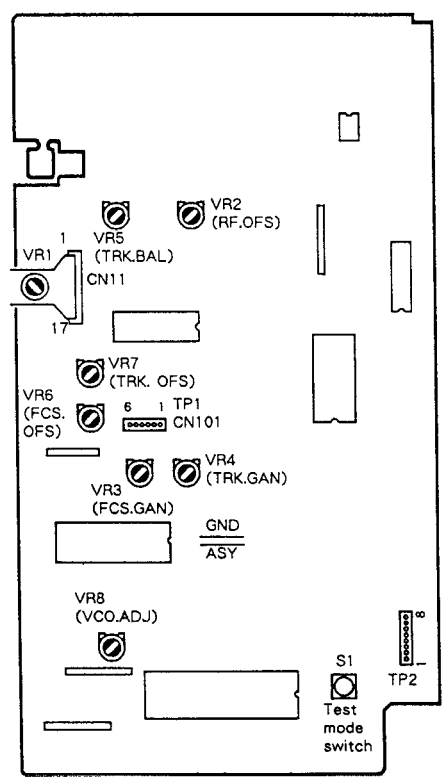
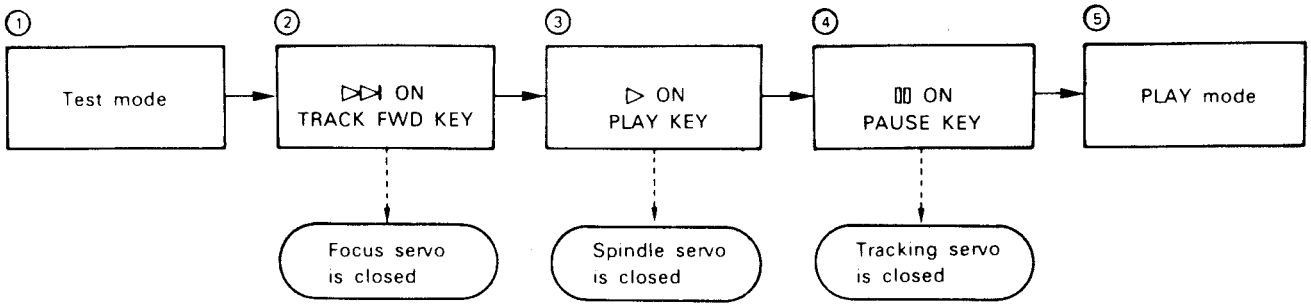


Fig. 9-1 Adjusting point

In the Test Mode, each servo circuit can be closed and opened by separate operations. Consequently, each servo must be closed one at a time (in serial sequence) to set PLAY mode.
Note that PLAY mode is not activated by simply pressing the PAUSE key (▯▯) in the Test Mode.

Example: Switching from STOP to PLAY mode.

* The each servo mechanisms operate in a serial sequence in the Test Mode.



• Key Functions in Test Mode

Symbol	Key name	Function during test mode	Description
▷▷|	TRACK FWD	Focus servo is closed.	Laser diode lights up. Actuator is moved up/down, then focus servo is closed.
▷	PLAY	Spindle servo is closed.	Spindle starts to rotate and the servo is closed when it turns into the CLV-A servo mode.
▯▯	PAUSE	Tracking servo is closed/opened.	Performs toggle operation. Closing the tracking servo and becomes PLAY mode by depressing the key (Focus servo and spindle servo must be closing), and PAUSE indicator lights up. Tracking servo opens by depressing the key again.
◁◁	MANUAL SEARCH REV	Carriage moves in reverse direction. (towards disc center)	Carriage is moved towards disc center at a fast speed of about 3 cm/sec. Since there is no safety mechanism to stop the carriage, release the key when the carriage reaches the end.
▷▷	MANUAL SEARCH FWD	Carriage moves in forward direction. (towards disc end)	Carriage is moved towards disc end at a fast speed of about 3 cm/sec. Since there is no safety mechanism to stop the carriage, release the key when the carriage reaches the end.
□	STOP	STOP	All servos are opened.
⏏	EJECT	(CD Magazine) EJECT	CD Magazine is ejected. However, pickup does not return to the park position. Moreover, even when disc is closed the pickup remains as is.

Table 9-1

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
1	TRACKING OFFSET, FOCUS OFFSET AND RF OFFSET ADJUSTMENT					
			TP1 PIN 2 (TRK.ERR)	VR5 (TRK.BAL)	45°	• Set to TEST mode. (See page 34.) • Turn VR5 TRK.BAL (Tracking balance) volume clockwise 45° from the center.
				VR7 (TRK.OFS)	0V±50 mV	• Adjust with VR7 TRK OFS (Tracking offset) volume so that the voltage of pin 2 TRK.ERR (Tracking error) of TP1 becomes 0V±50 mV.
			TP1 PIN 6 (FCS.ERR)	VR6 (FCS.OFS)	FOCUS offset 0V±50 mV	• Adjust VR6 FCS.OFS (focus offset) so that the FCS.ERR (focus error) voltage at TP1 pin 6 becomes 0V±50 mV.
			TP1 PIN 1 (RF OUTPUT)	VR2 (RF.OFS)	RF offset 100 mV±50 mV	• Adjust VR2 RF.OFS (RF offset) so that the RF output voltage at TP1 PIN 1 becomes 100 mV±50 mV.
2	RF LEVEL ADJUSTMENT					
			TP1 Pin 1 (RF)	VR1 Laser power	1.5Vp-p$^{+0.2}_{-0}$ V	• Set to TEST mode. (See page 34.) • Play TEST disc and connect probe of an oscilloscope to pin 1 RF (RF output) of TP1 and measure the P-P voltage of RF waveform. • Adjust VR1 (Laser power) so that the value is within 1.5Vp-p$^{+0.2}_{-0}$ V.
3	LD (LASER DIODE) OUTPUT POWER CONFIRMATION					
					Confirmation: less than 0.13 mW	• Set to TEST mode. (See page 34.) • Press TRACK FWD key (▷▷|) and turn ON LD (laser diode). • Place sensor of the laser power meter immediately above the object lens and confirm that the output power of the LD is less than 0.13 mW.
4	FOCUS LOCK AND SPINDLE LOCK CONFIRMATION					
					RF output exists	• Set TEST disc. • Set to TEST mode. (See page 34.) • Shift the pickup close to the center of the disc by pressing the MANUAL SEARCH FWD key (▷▷). * Note that this step must be performed. • Observe pin 1 RF (RF output) of TP1 with an oscilloscope and confirm that the RF signal is output after pressing the TRACK FWD key (▷▷|).
	0.5V/div	100 msec/div	TP1 Pin 1 (RF output)		Normal rotation	• Press PLAY key (▷) and be sure that the disc rotates in normal direction at almost the specified speed (as it is close to the center of the disc, the rotating speed is around 30 rpm) and not rotates abnormally or inversely.

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
5	GRATING ADJUSTMENT					
						• Set to TEST mode. (See page 34.) • Shift the pickup close to the center of the disc by pressing MANUAL SEARCH FWD key (▷▷) so that the grating adjustment screw of the pickup can be seen through the oval hole of the upper side of the servo mechanism. • Insert a grating driver into the adjusting hole from the upper side of the mechanism as shown in Fig. 9-2, and confirm that the grating screw turns. • Press TRACK FWD key (▷▷|) and PLAY key (▷) sequentially and close the focus servo and spindle servo. (Do not close the tracking servo.) • Observe the waveform of pin 2 TRK.ERR (Tracking error) of TP1 with an oscilloscope. At this point, insert a 4 kHz cutoff low-pass filter. (Fig. 9-3)
	0.5V/div	5 ms/div	TP1 Pin 2 TRK.ERR	Grating Grating	Null point Maximum amplitude	• Turn a grating driver and find null point. (Photo. 9-1) • Then, turn slowly the grating driver **counter clockwise** from the null point and adjust at the point where the waveform (Tracking error signal) firstly becomes maximum amplitude. (See Photo. 9-3.) Note: If the grating driver is pressed strongly, the pickup moves toward disc center, accordingly adjustment becomes difficult. • Finally, be sure to confirm that the tracking error signal (at this time, 4 kHz of cutoff low-pass filter is not inserted) when the pickup is moved toward the disc center and the P-P voltage of the tracking error signal at the outer circumference of the disc are not varied greatly. When the level is deviated over ±10%, adjust again by turning grating screw to the maximum error amplitude point.

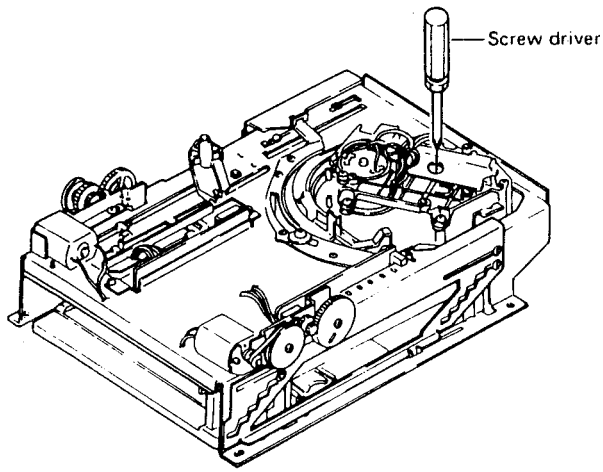


Fig. 9-2

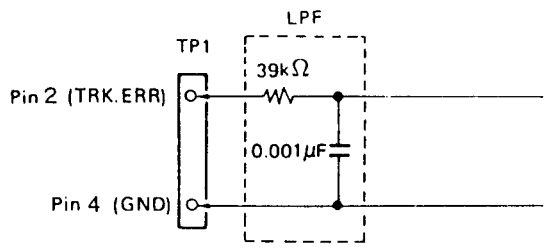


Fig. 9-3

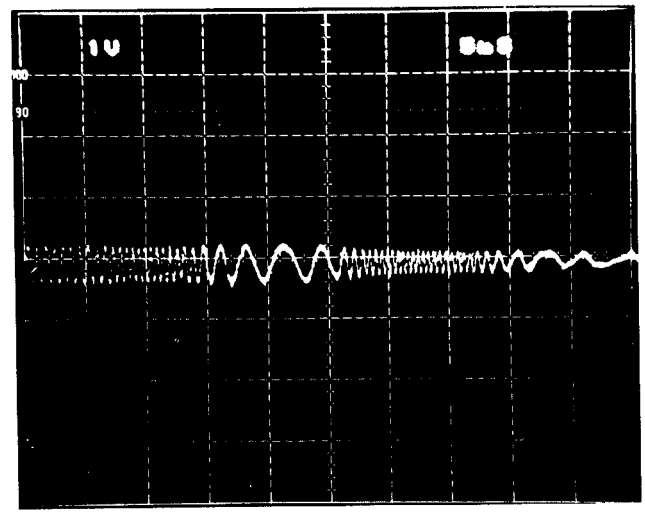


Photo. 9-1 Null point

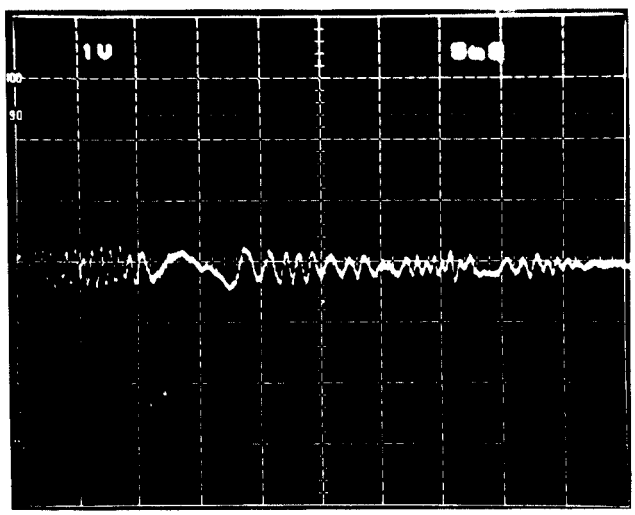


Photo. 9-2 Waveform of not null point

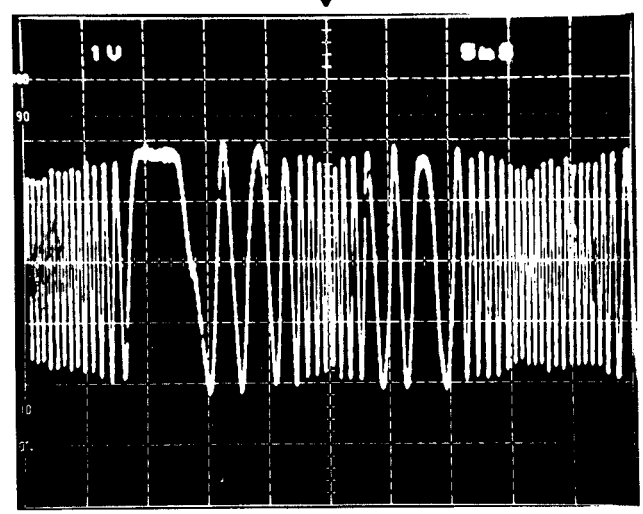


Photo. 9-3 Maximum amplitude

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
6	TRACKING BALANCE ADJUSTMENT					
	0.5V/div	5 msec /div	TP1 Pin 2 (TRK.ERR)	VR5 (TRK.BAL)	(TRK.ERR)	• Set the TEST disc. • Set to TEST mode. (See page 34.) • Shift the carriage close to the center of the disc by pressing MANUAL SEARCH FWD key (▷▷). • Press TRACK FWD key (▷▷|), and PLAY key (▷) to start turning the disc. • Observe pin 2 TRK.ERR (Tracking error) of TP1 with an oscilloscope and adjust with VR5 TRK.BAL (Tracking balance) volume so that the DC component of the tracking error disappears. Note: Before proceeding with the above adjustments, be sure to adjust the tracking error offset.

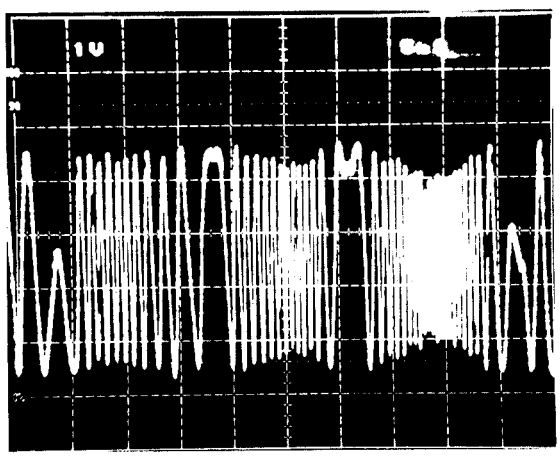


Photo. 9-4 DC component exists

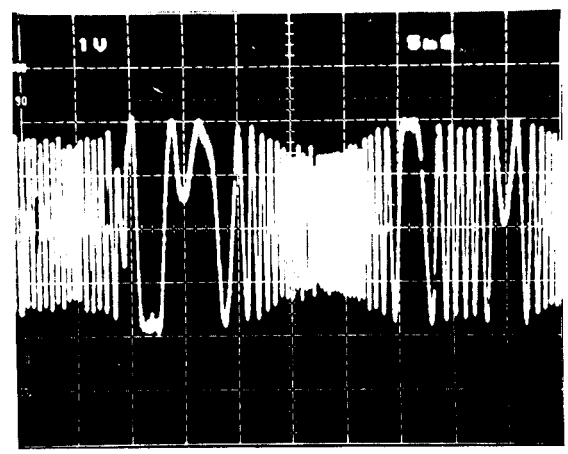
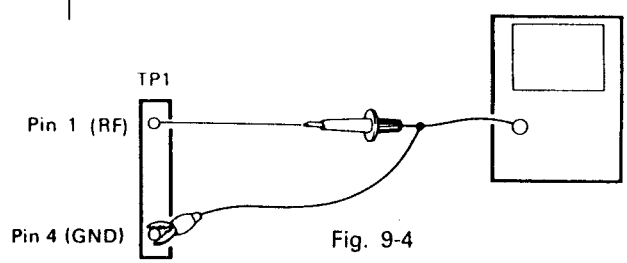
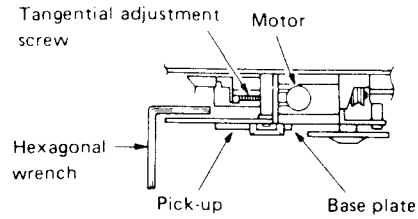


Photo. 9-5 DC component not exist

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
7	TANGENTIAL ADJUSTMENT					
		200nS	TP1 Pin 1 (RF output)	Tangential adjustment screw	Best eye pattern	• Set the TEST disc. • Set to TEST mode. (See page 34.) • Shift the pickup close to the center of the disc by pressing MANUAL SEARCH FWD key (▷▷). • Press TRACK FWD key (▷▷I), PLAY key (▷) and PAUSE key (⏸) sequentially, and close all the servos. (Pause indicator lights up.) • Observe pin 1 RF (RF output) of TP1 with an oscilloscope and adjust with the tangential screw so that the eye pattern becomes clear. (Fig. 9-4) • The adjusting point is the middle point between the point where the eye pattern becomes deteriorate by turning the tangential screw clockwise and the point where the eye pattern becomes deteriorate by turning the tangential screw counterclockwise. As a criterion, observe that the overall waveform is clear and one of the diamond shapes within the eye pattern (Photo. 9-6), and adjust at as an optimum point where the diamond shape is seen relatively fine line.  Fig. 9-4 Note: During the adjustment, hold hexagonal wrench to upward so as to keep the pickup body not goes down.



In the figure below, the top and bottom is opposite to that of the actual product.

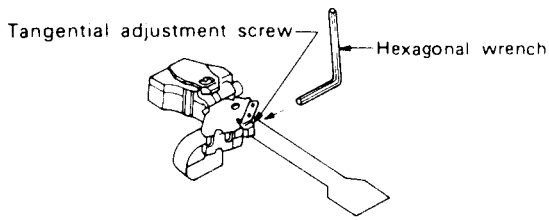
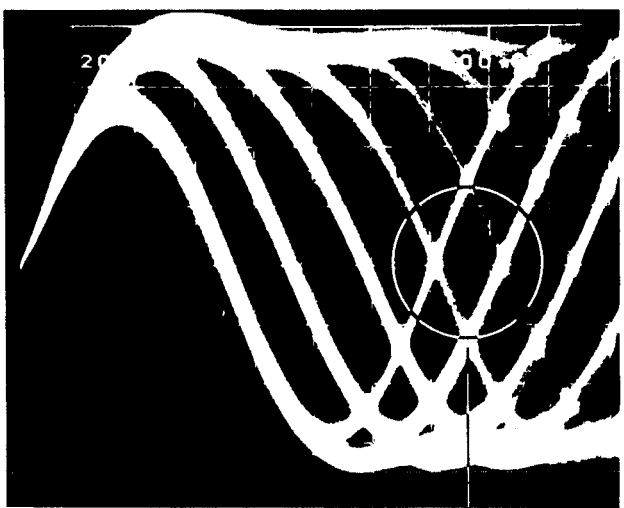


Fig. 9-5 Tangential adjustment



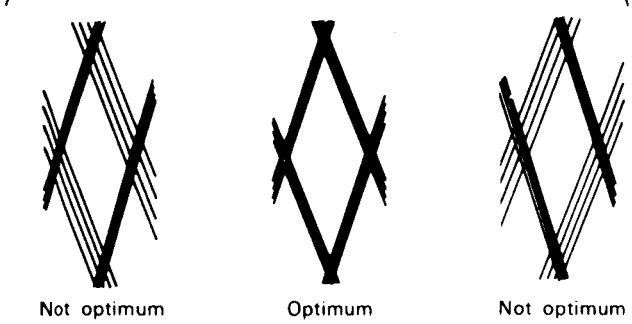


Photo. 9-6

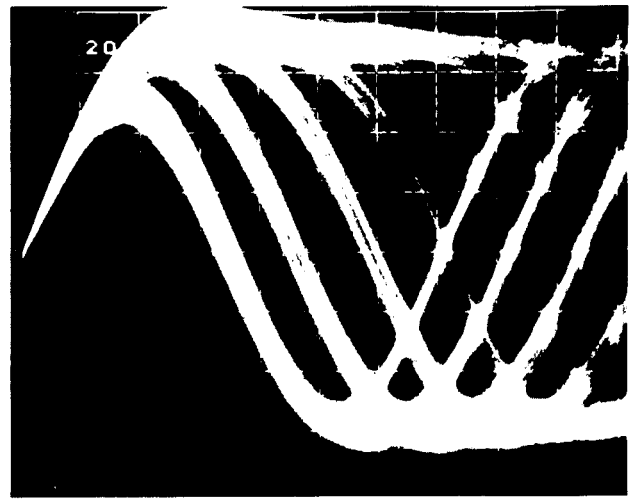


Photo. 9-7

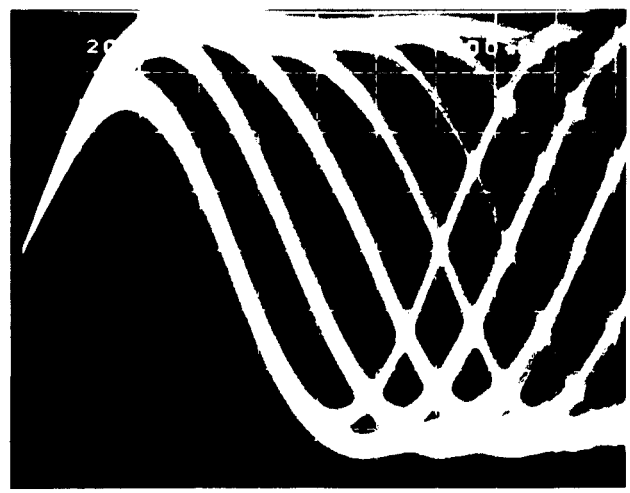


Photo. 9-8

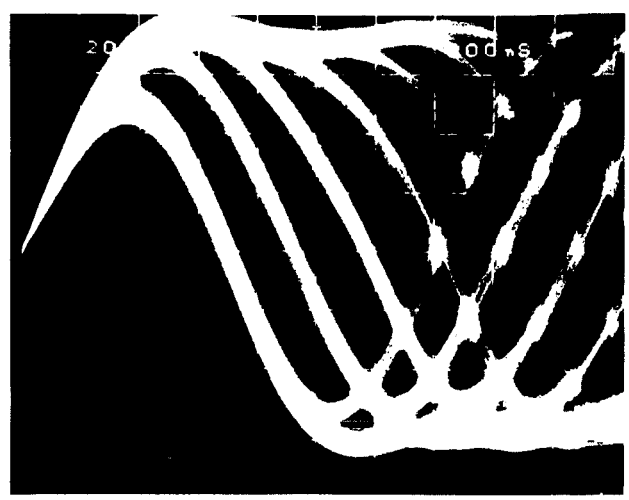


Photo. 9-9

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
8	FOCUS GAIN ADJUSTMENT					
	20mV/div.5/mV/div. CH1 (X), CH2 (Y). (Probe 10 : 1)		X axis TP1 Pin 5 (FCS.IN) Y axis TP1 Pin 6 (FCS.ERR)	VR3 (FCS.GAN)	Phase difference 90°	• In the POWER OFF state, connect an oscilloscope and oscillator as shown in Fig. 9-6. • Set to TEST mode. (See page 34.) • Press TRACK FWD key (▷▷|), PLAY key (▷) and PAUSE key (▯▯) sequentially, and turn ON the each servos of focus, spindle and tracking. • Turn the POWER of oscillator ON and output 1.6kHz 1 Vp-p. Note: (Depending upon oscillators, some of them output DC when their power turned ON. Therefore, it is desirable to connect oscillator after turning the power ON.) • Adjust with VR3 FCS.GAN (Focus gain) volume so that the lissajous figure of the oscilloscope becomes horizontal circle (Phase difference 90°).

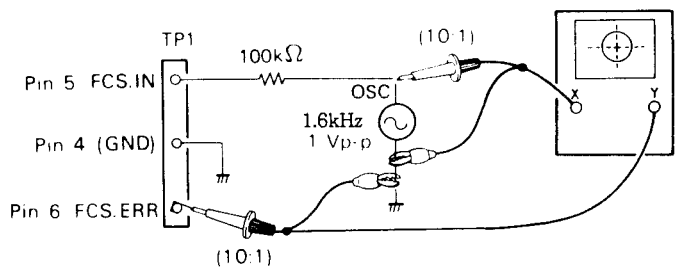


Fig. 9-6

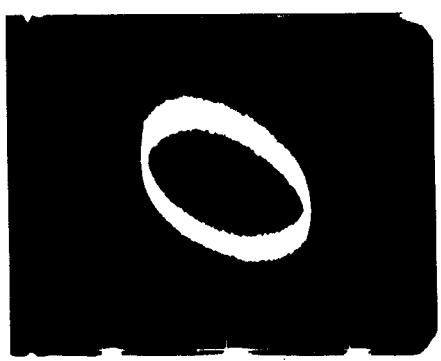


Photo. 9-10 High gain

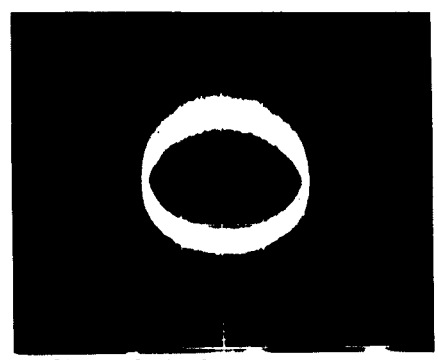


Photo. 9-11 Optimum gain

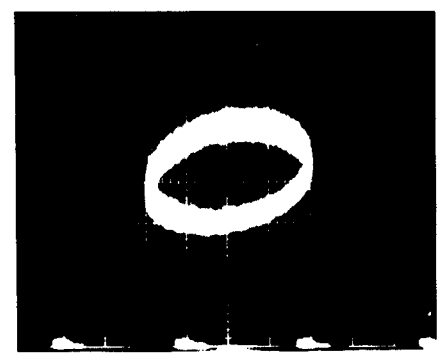


Photo. 9-12 Low gain

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
9	TRACKING GAIN ADJUSTMENT					
	50 mV/div 5mV/div CH1 (X), CH2 (Y) (Probe 10 : 1)		X axis TP1 Pin 3 (TRK.IN) Y axis TP1 Pin 2 (TRK.ERR)	VR4 (TRK.GAN)	Phase difference 90°	• In the POWER OFF state, connect an oscilloscope and oscillator as shown in Fig. 9-7. • Set to TEST mode. (See page 34.) • Press TRACK FWD key (▷▷|), PLAY key (▷) and PAUSE key (⏸) sequentially, and turn ON the each servos of focus, spindle and tracking. Turn the POWER of oscillator ON and output 1.2 kHz 2 Vp-p. Note: (Depending upon oscillators, some of them output DC when their power turned ON. Therefore, it is desirable to connect oscillator after turning the power ON.) • Adjust with VR4 TRK GAN (Tracking gain) volume so that the lissajous figure of the oscilloscope becomes horizontal circle (phase difference 90°).

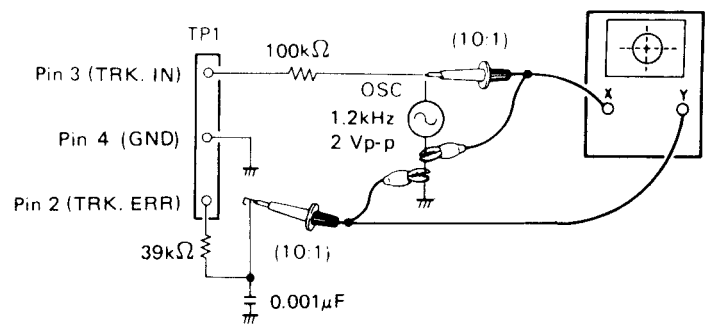


Fig. 9-7

Photo. 9-13 High gain

Photo. 9-14 Optimum gain

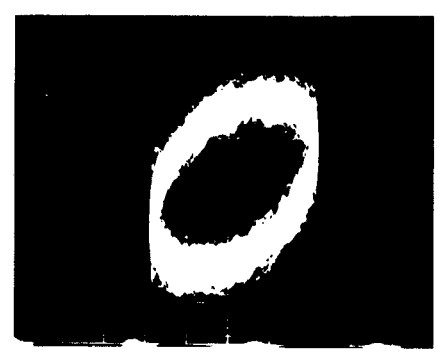


Photo. 9-15 Low gain

Step No.	Oscilloscope Setting V	Oscilloscope Setting H	Test Points	Adjusting Points	Check items/ Adjustment specifications	Adjustment procedure
10	VCO FREE RUN FREQUENCY ADJUSTMENT					
			TP2 Pin 2	VR8 (VCO.ADJ)	4.275 ±0.025 MHz	• Set to TEST mode. (See page 34.) • Short-circuit between ASY and GND jumper with grating driver, etc. (Fig. 9-8) • Connect frequency counter, which is measurable over 10 MHz, to pin 2 of TP2. • Adjust with VR8.VCO ADJ (VCO adjustment) volume so that the value of frequency counter becomes 4.275±0.025 MHz.
11	METHOD TO CONFIRM S CHARACTER (FOCUS ERROR)					
						• Set to TEST mode. (see page 34). • Short-circuit between pin 5 FCS. IN (Focus in) of TP1 and GND. • Press TRACK FWD key (▷▷I) and observe the waveform of pin 6 FCS.ERR (Focus error) of TP1 at that time with an oscilloscope.
12	MSB adjustment					
	5mV/div	0.2 msec/div	JA1 LINE OUT terminal (Lch)	VR702	Sine wave	• Set the unit to normal play mode. (see page 34). • Play back the 20th track (−60 dB, 1 kHz, L/Rch) of the test disc (YEDS-7). Connect an oscilloscope to L ch of the LINE OUT terminals and observe the audio output waveform. • Adjust VR702 MSB.ADJ Lch (MSB adjust, right channel) so that the waveform on the oscilloscope becomes a sine wave. • Perform the same adjustment for R-CH (VR701).
			JA1 LINE OUT terminal (Rch)	VR701	Sine wave	

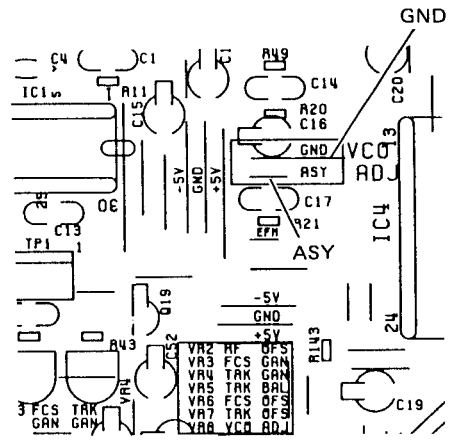
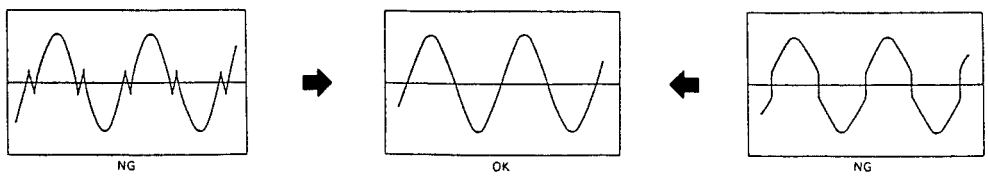


Fig. 9-8



9. RÉGLAGE

Les réglages pour ce modèle doivent être réalisés dans l'ordre indiqué ci-dessous.

• Réglages et vérifications à effectuer

1. Réglages de l'offset de centrage de piste, de l'offset de focalisation et de l'offset RF.
2. Réglage du niveau RF
3. Vérification de la puissance de sortie de la diode laser (LD)
4. Vérification du verrouillage de focalisation et du verrouillage de moyeu
5. Réglage du réseau
6. Réglage de l'équilibrage de centrage de piste
7. Réglage tangentiel
8. Réglage du gain de focalisation
9. Réglage du gain de centrage de piste
10. Réglage de la fréquence propre du VCO
11. Méthode de contrôle de la caractéristique S (erreur de focalisation)
12. Adjustment MBS

• Matériel de mesure

1. Oscilloscope double trace
2. Appareil de mesure pour puissance laser
3. Disque d'essai (YEDS7)
4. Filtre de réglage pour équilibrage de centrage de piste
5. Filtre de réglage pour gain de boucle
6. Générateur de signal
7. Fréquencemètre
8. Outillage général divers

• Mode d'essai

Tous les réglages doivent être réalisés dans le mode d'essai (Test Mode).

Méthodes de réglage et d'annulation du mode d'essai

(1) Pour régler le mode d'essai, placer l'interrupteur d'alimentation (POWER) du lecteur (S401) sur la position de marche (ON) en appuyant sur l'interrupteur de mode d'essai (TEST MODE SWITCH) (S1).

(2) Pour annuler le mode d'essai, amener simplement l'interrupteur d'alimentation (POWER) du lecteur sur la position d'arrêt (OFF).

Les différentes fonctions des touches dans le mode d'essai sont indiquées dans le tableau 9-1.

• Points de réglage

VR1: Puissance laser
VR7: Décalage de centrage de piste (TRK.OFS)
VR3: Gain de focalisation (FCS.GAN)
VR4: Gain de centrage de piste (TRK.GAN)
VR5: Equilibrage de centrage de piste (TRK.BAL)
VR6: Décalage de focalisation (FCS.OFS)
VR8: Réglage du VCO (VCO.ADJ)
VR2: Offset RF (RF.OFS)

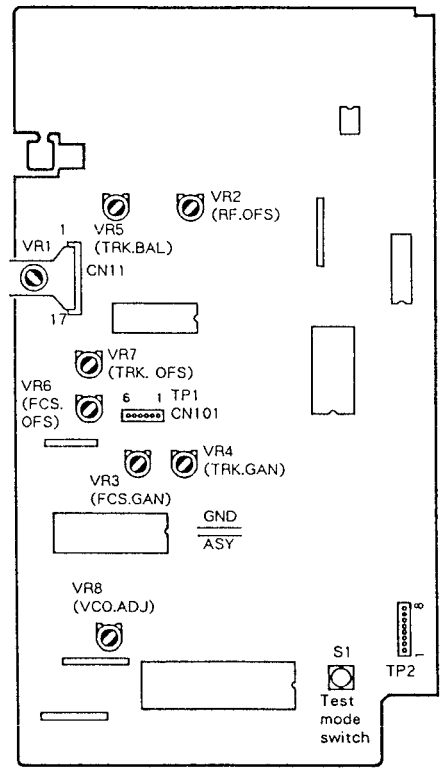


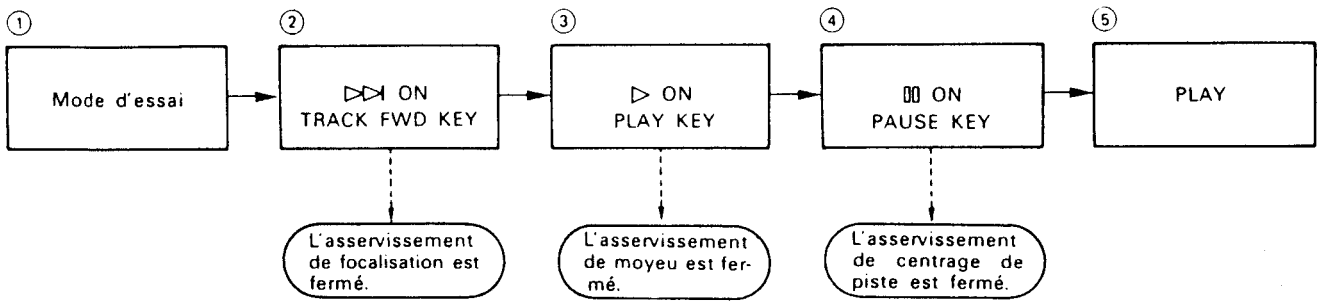
Fig. 9-1 Point de réglage

Dans le mode d'essai (Test Mode), chaque circuit asservi peut être fermé ou ouvert au moyen d'opérations séparées. En conséquence, les asservissements doivent être fermés l'un après l'autre (séquentiellement) pour régler le mode de lecture (PLAY).

Note: Le mode de lecture (PLAY) n'est pas simplement mis en oeuvre par l'enfoncement de la touche PAUSE (⏸) dans le mode d'essai.

Exemple: Commutation du mode d'arrêt (STOP) au mode de lecture (PLAY).

* Dans le mode d'essai (Test Mode), chaque servomécanisme agit séquentiellement.



• Fonction des touches dans le mode d'essai (Test Mode)

Symbole	Désignation de touche	Fonction pendant le mode d'essai	Description
⏭	TRACK FWD	Asservissement de focalisation fermé	La diode laser s'allume. Le moteur d'asservissement se déplace vers le haut/bas, puis l'asservissement de focalisation est fermé.
▷	PLAY	Asservissement de moyeu fermé	Le moyeu commence à tourner et l'asservissement est fermé lorsqu'il passe dans le mode CLV-A.
⏸	PAUSE	Asservissement de centrage de piste ouvert/fermé	Réalise l'opération de bascule. Fermeture de l'asservissement de centrage de piste et passage en mode de lecture (PLAY) en appuyant sur la touche (l'asservissement de focalisation et l'asservissement de moyeu doivent se fermer); le voyant de PAUSE s'allume. L'asservissement de centrage de piste s'ouvre par une nouvelle pression sur la touche.
⏮	MANUAL SEARCH REV	Le chariot se déplace en arrière (vers le centre du disque).	Le chariot se déplace vers le centre du disque à une vitesse élevée d'environ 3 cm/s. Comme il n'y a pas de dispositif de sécurité, relâcher la touche dès que le chariot arrive en fin de course.
⏭	MANUAL SEARCH FWD	Le chariot se déplace en avant (vers le centre du disque).	Le chariot se déplace vers la fin du disque à la vitesse élevée d'environ 3 cm/s. Comme il n'y a pas de dispositif de sécurité, relâcher la touche dès que le chariot arrive en fin de course.
□	STOP	Arrêt	Tous les asservissements sont ouverts
⏏	EJECT	Ejection du magasin de clisque compact	Le magasin du disque compact est éjecté. Néanmois, la tête de lecture ne revient pas sur sa position de repos. De plus, même lorsque le disque est enfermé, la tête de lecture demeure tel quel.

Tableau 9-1

Pas No.	Réglage de l'oscilloscope V	Réglage de l'oscilloscope H	Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
1.	REGLAGES DE L'OFFSET DE CENTRAGE DE PISTE, DE L'OFFSET DE FOCALISATION ET DE L'OFFSET RF					
			TP1 broche 2 (TRK.ERR)	VR5 (TRK.BAL)	45°	• Régler le mode d'essai (TEST). (Voir page 45.)
				VR7 (TRK.OFS)	0V±50 mV	• Tourner le potentiomètre VR5 TRK.BAL (équilibrage de centrage de piste) de 45° depuis le centre dans le sens des aiguilles d'une montre.
			TP1 BROCHE 6 (FCS.ERR)	VR6 (FCS.OFS)	Offset de focalisation 0V±50 mV	• Ajuster le potentiomètre VR7 TRK.OFS (décalage de centrage de piste) de façon à ce que la tension à la broche 2 TRK.ERR (erreur de centrage de piste) de TP1 devienne égale à 0V±50 mV.
			TP1 BROCHE 1 (RF OUTPUT)	VR2 (RF.OFS)	Offset RF 100 mV±50 mV	• Régler VR6 FCS.OFS (offset de focalisation) de manière à ce que la tension de FCS.ERR (erreur de focalisation) relevée sur la broche 6 de TP1 soit de 0V±50 mV.
						• Régler VR2 RF.OFS (offset HF) de manière à ce que la tension de RF OUTPUT (sortie HF) relevée sur la broche 1 de TP1 soit de 100 mV±50 mV.
2.	REGLAGE DU NIVEAU RF					
			TP1 Broche 1 (RF)	VR1 Puissance laser	1,5Vp-p $^{+0,2}_{-0}$ V	• Régler le mode d'essai (TEST). (Voir page 45.) • Reproduire le disque d'essai (TEST) et raccorder la sonde d'un oscilloscope à la broche 1 RF (sortie RF) de TP1 et mesurer la tension C-C de la forme d'onde RF. • Régler la puissance laser de facon que la tension soit de 1,5Vp-p $^{+0,2}_{-0}$ V.
3.	CONTRÔLE DE LA PUISSANCE DE SORTIE DE LA DIODE LASER (LD)					
					Confirmation: moins de 0,13 mW	• Régler le mode d'essai (TEST). (Voir page 45.) • Appuyer sur la touche de centrage de piste arrière (TRACK FWD) (⋈) et enclencher la diode laser (LD). • Placer la capteur de l'instrument destiné à mesurer la puissance laser au dessus de l'objectif et vérifier que la puissance de sortie de la diode laser (LD) est inférieure à 0,13 mW.
4.	CONTRÔLE DU VERROUILLAGE DE FOCALISATION ET DU VERROUILLAGE DE MOYEU					
	0,5 V/div.	100 ms/div.	TP1 broche 1 (sortie RF)		Présence de sortie RF Rotation normale	• Mettre en place le disque d'essai (TEST). • Régler le mode d'essai (TEST). (Voir page 45.) • Déplacer la tête de lecture à proximité du centre du disque en appuyant sur la touche de recherche [MANUAL SEARCH FWD (⋗⋗)]. • Cette étape doit absolument être réalisée. • Observer le signal RF à la broche 1 de TP1 (sortie RF) au moyen d'un oscilloscope et vérifier que le signal RF sorte après l'enfoncement de la touche d'avance de piste TRACK FWD (⋈). • Appuyer sur la touche de lecture (PLAY) (▷) et s'assurer que le disque tourne en sens normal avec approximativement la vitesse spécifiée (étant près du centre du disque, la vitesse de rotation est d'environ 30 tr/mn), sans anomalie ni inversion du sens de rotation.

Pas No.	Réglage de l'oscilloscope V	Réglage de l'oscilloscope H	Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
5.	**RÉGLAGE DE LA MIRE**					
						• Régler le mode d'essai (TEST). (Voir page 45.) • Amener la tête de lecture à proximité du centre du disque en appuyant sur la touche de recherche manuelle avant (MANUAL SEARCH FWD) (▷▷), de façon à ce que la vis de réglage du réseau de la tête de lecture puisse être vue à travers le trou oval situé à la partie supérieure de l'asservissement. • Introduire un outil pour réseau dans le trou de réglage depuis la partie supérieure du mécanisme, comme illustré à la figure 9-2, puis vérifier que la vis de réseau tourne. • Appuyer séquentiellement sur les touches de piste avant TRACK FWD (▷⋈) et de lecture (PLAY) (▷), et fermer les asservissements de focalisation et de moyeu. (Ne pas fermer l'asservissement de centrage de piste.) • Observer la forme d'onde à la broche 2 TRK.ERR (erreur de centrage de piste) de TP1 au moyen d'un oscilloscope. Introduire alors un filtre de coupure passe-bas 4 kHz. (Figure 9-3)
	0.5 V/div.	5 ms/div.	TP1 Broche 2 TRK.ERR	Réseau Réseau	Point zéro Amplitude maximum	• Faire touner un outil de réseau et rechercher le point zéro. (Photo 9-1) • Tourner ensuite lentement dans **le sens contraire des aiguilles d'une montre** l'outil de réseau depuis le point zéro et l'ajuster sur le point où la forme d'onde (signal d'erreur de centrage de piste) présente une première amplitude maximum. (Voir photo 9-3.) Note: Si l'outil de réseau est appuyé avec force, la tête de lecture se déplace vers le centre du disque et le réglage devient difficile à effectuer. • Finalement, s'assurer que le signal d'erreur de centrage de piste (cette fois-ci le filtre de coupure passe-bas à 4 kHz n'est pas introduit) n'a pas beaucoup varié lorsque la tête de lecture est déplacée vers le centre du disque, et aussi que la tension C-C du signal de centrage de piste n'a pas non plus beaucoup varié sur la circonférence extérieure du disque. Lorsque le niveau varie de plus de ±10%, recommencer le réglage en tournant la vis de réseau jusqu'au point d'amplitude d'erreur maximum.

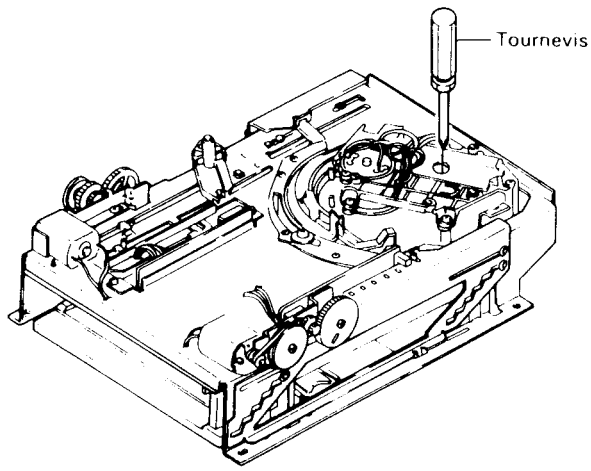


Fig. 9-2

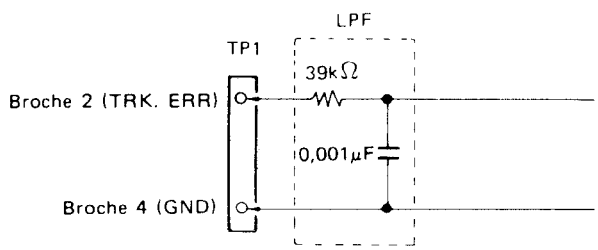


Fig. 9-3

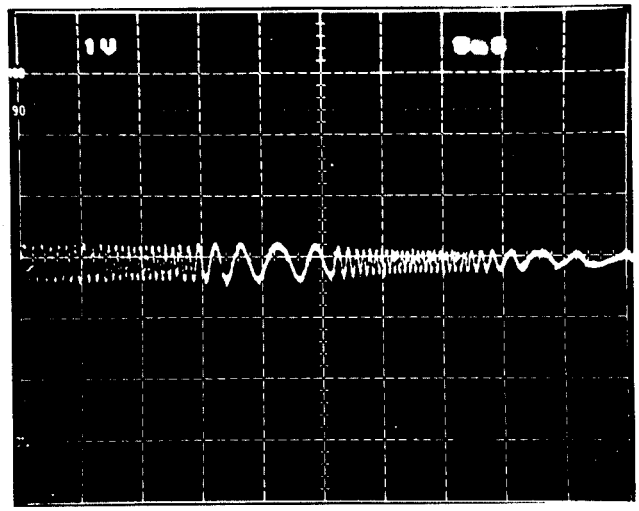


Photo. 9-1 Point zéro

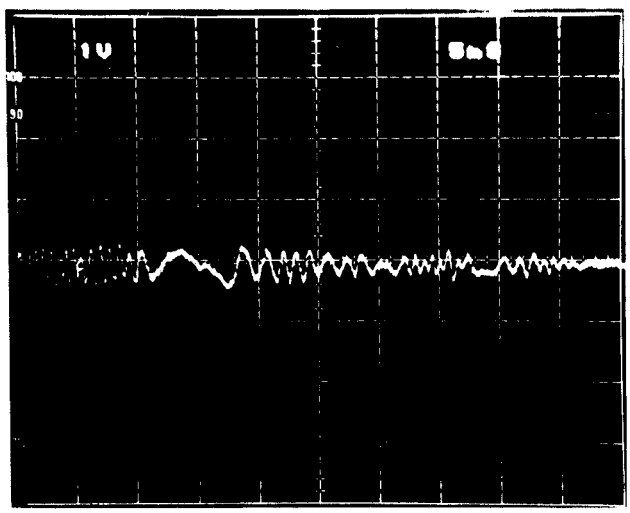


Photo. 9-2 Forme d'onde hors du point zéro

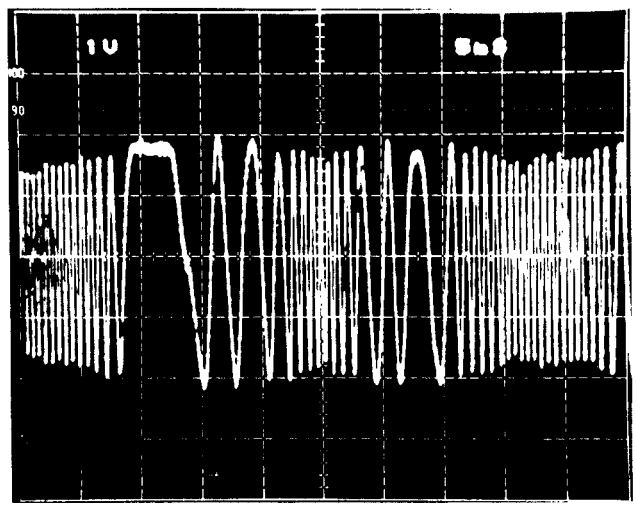


Photo. 9-3 Amplitude maximum

Pas No.	Réglage de l'oscilloscope V	Réglage de l'oscilloscope H	Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
6.	**RÉGLAGE DE L'ÉQUILIBRAGE DE CENTRAGE DE PISTE**					
	0,5 V/div.	5 ms/div.	TP1 Broche 2 (TRK.ERR)	VR5 (TRK.BAL)	TRK.ERR	• Mettre en place le disque d'essai (TEST). • Régler le mode d'essai (TEST). (Voir page 45.) • Amener la tête de lecture à proximité du centre du disque en appuyant sur la touche de recherche manuelle avant (MANUAL SEARCH FWD) (▷▷). • Appuyer sur la touche de piste avant (TRACK FWD) (▷▷|) et sur la touche de lecture (PLAY) (▷) pour faire tourner le disque. • Observer la broche 2 TRK.ERR (erreur de centrage de piste) de TP1 au moyen d'un oscilloscope et ajuster au moyen du potentiomètre VR5 TRK.BAL (équilibrage de centrage de piste) de façon à ce que la composante continue de l'erreur de centrage de piste disparaisse. Note: Avant de procéder aux ajustements ci-dessus, veiller à régler le décalage d'erreur de piste.

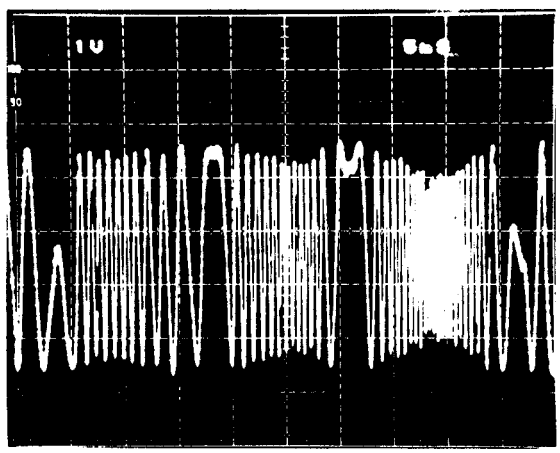


Photo. 9-4 Présence de la composante continue

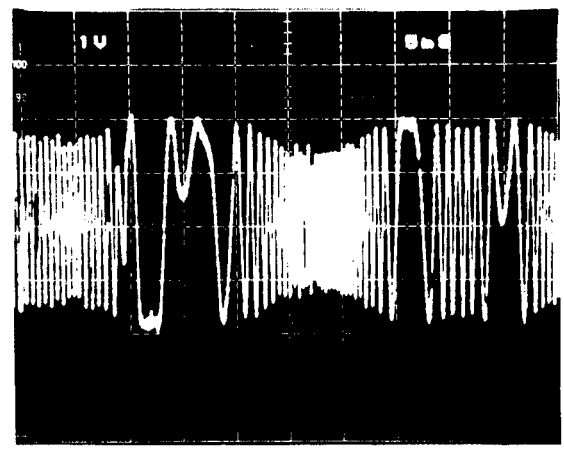


Photo. 9-5 Absence de la composante continue

Pas No.	Réglage de l'oscilloscope V	Réglage de l'oscilloscope H	Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
7.	**RÉGLAGE TANGENTIEL**					
		200 ns	TP1 Broche 1 (sortie RF)	Vis de réglage tangentiel	Mire Best Eye	• Mettre en place le disque d'essai (TEST) • Régler le mode d'essai (TEST). (Voir page45.) • Amener la tête de lecture à proximité du centre du disque en appuyant sur la touche de recherche manuelle avant (MANUAL SEARCH FWD) (▷▷). • Appuyer séquentiellement sur les touches d'avance de piste (TRACK FWD) (▷▷|), de lecture (PLAY) (▷) et de pause (PAUSE) (▯▯), et fermer tous les asservissements. (Le voyant de pause s'allume.) • Observer le signal RF à la broche 1 (sortie RF) de TP1 au moyen d'un oscilloscope et régler au moyen de la vis tangentielle, de façon à ce que la mire Best Eye devienne claire. (Figure 9-4) • Le point de réglage se situe au milieu entre le point ou la mire se détériore en tournant la vis tangentielle dans le sens des aiguilles d'une montre et le point où la mire se détériore en tourant la vis tangentielle dans le sens inverse des aiguilles d'une montre. Comme critère, observer que la forme d'onde globale soit claire et que l'une des formes de losange se situe dans la mire (Photo 9-6); réaliser le réglage en un point optimum où la forme de losange apparaît avec des traits relativement fins.

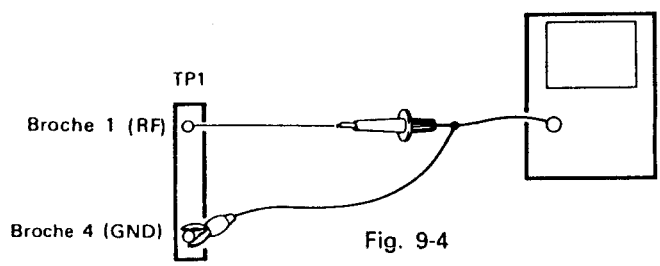
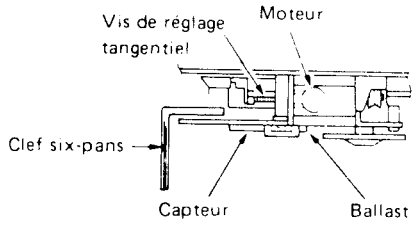


Fig. 9-4

Note: Pendant le réglage, tenir la clef six-pans vers le haut de facon à ce que le corps de la tête de lecture ne descende pas.



Dans l'illustration ci-dessous, le dessus et le dessous de l'appareil sont en réalité à l'envers.

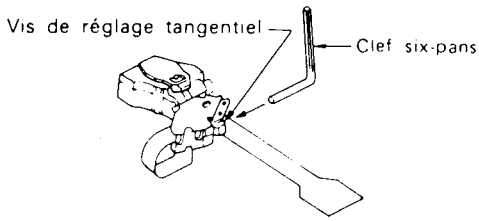
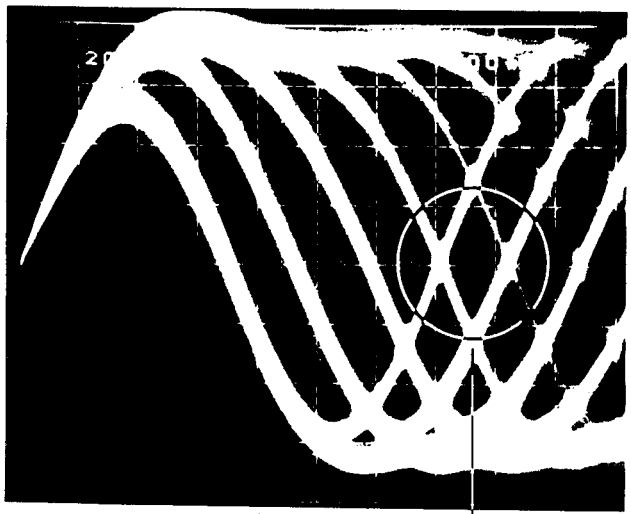


Fig. 9-5 Réglage tangentiel



Partie à observer

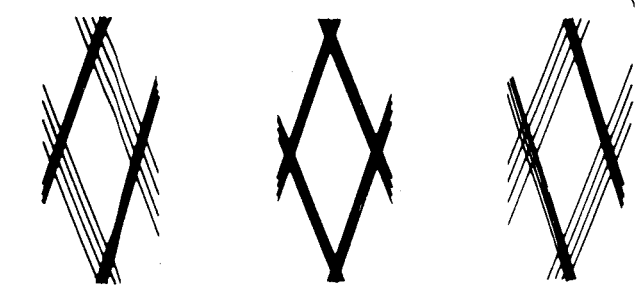


Photo. 9-6

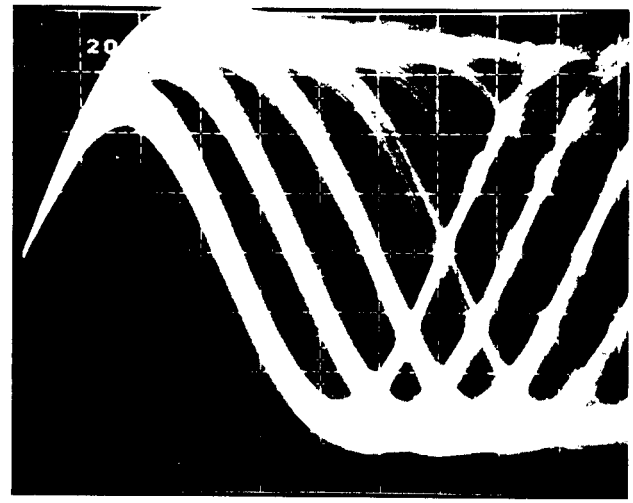


Photo. 9-7

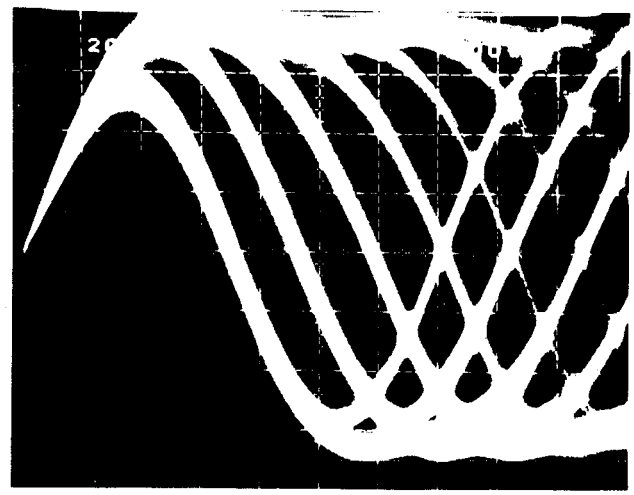


Photo. 9-8

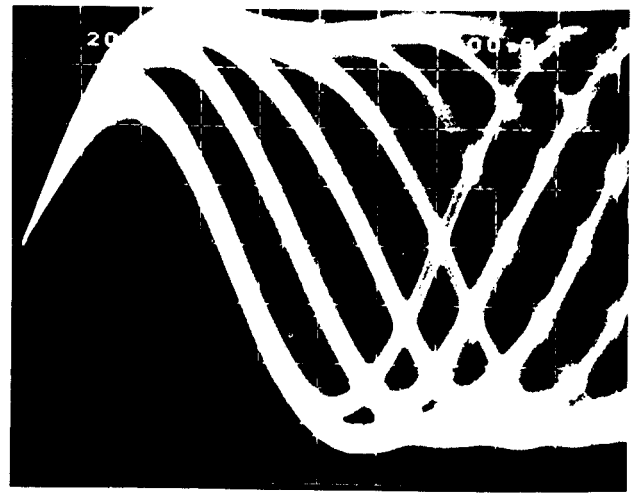


Photo. 9-9

Pas No	Réglage de l'oscilloscope V	Réglage de l'oscilloscope H	Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
8.	RÉGLAGE DU GAIN DE FOCALISATION					
	20 mV/div. 5 mV/div. Canal 1(X), Canal 2(Y) (Sonde 10:1)		Axe X TP1 Broche 5 (FCS.IN) Axe Y TP1 Broche 6 (FCS.ERR)	VR3 (FCS.GAN)	Différence de phase 90°.	• L'alimentation étant coupée (POWER OFF), raccorder un oscilloscope et un oscillateur de la manière indiquée à la figure 9-6. • Régler le mode d'essai (TEST). (Voir page 45.) • Appuyer séquentiellent sur les touches d'avance de piste (TRACK FWD) (▷▷|), de lecture (PLAY) (▷) et de pause (PAUSE) (▯▯), puis enclencher chaque asservissement de focalisation, moyeu et centrage de piste. • Enclencher l'alimentation de l'oscillateur et délivrer un signal de 1,6kHz à 1 Vc-c. Note: (En fonction de l'oscillateur utilisé, certains appareils fournissent un courant continu lors de leur enclenchement. Par conséquent, il est préférable de raccorder l'oscillateur après avoir enclenché son alimentation.) • Ajuster le potentiomètre VR3 FCS.GAN (gain de focalisation) de façon à ce que la figure de Lissajou observée sur l'oscilloscope devienne un cercle horizontal (déphasage 90°).

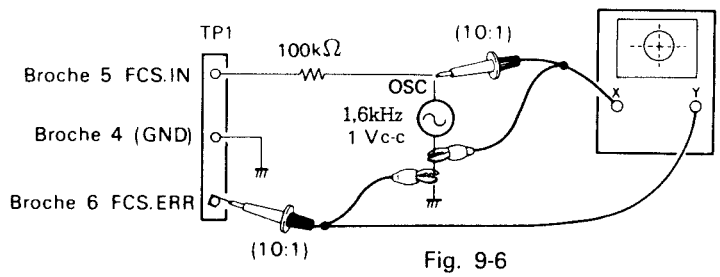


Fig. 9-6

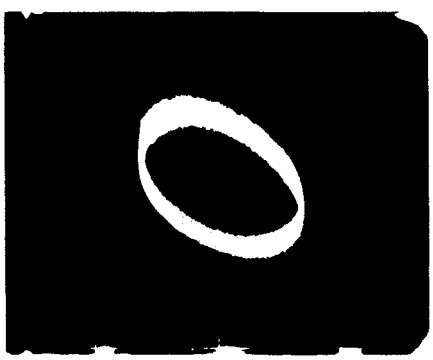


Photo. 9-10 Gain élevé

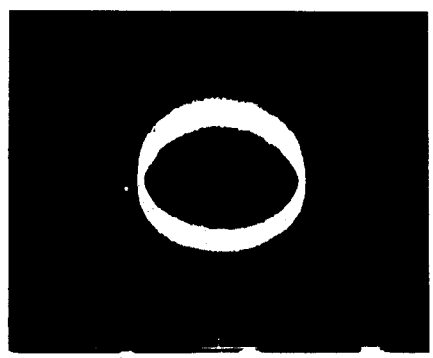


Photo. 9-11 Gain optimum

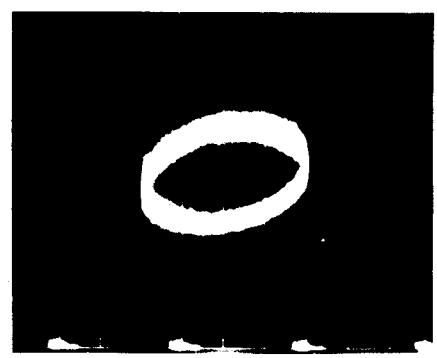


Photo. 9-12 Gain réduit

Pas No.	Réglage de l'oscilloscope V	Réglage de l'oscilloscope H	Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
9.	RÉGLAGE DU GAIN DE CENTRAGE DE PISTE					
	50 mV/div. 5 mV/div. Canal 1 (X), Canal 2 (Y) (Sonde 10:1)		Axe X TP1 Broche 3 (TRK.IN) Axe Y TP1 Broche 2 (TRK.ERR)	VR4 (TRK.GAN)	Déphasage 90°	• L'alimentation étant coupée (POWER OFF), raccorder un oscilloscope et un oscillateur de la manière indiquée à la figure 9-7. • Régler le mode d'essai (TEST). (Voir page 45.) • Appuyer séquentiellement sur les touches d'avance de piste (TRACK FWD) (▷▷|), de lecture (PLAY) (▷) et de pause (PAUSE) (▯▯), puis enclencher chaque asservissement de focalisation, moyeu et centrage de piste. Enclencher l'alimentation de l'oscillateur et fournir un signal de 1,2 kHz à 2 Vc-c. Note: (En fonction de l'oscillateur utilisé, certains appareils fournissent un courant continu lors de leur enclenchement. Par conséquent, il est préférable de raccorder l'oscillateur après avoir enclenché son alimentation.) • Ajuster le potentiomètre VR4 TRK GAN (gain de centrage de piste) de façon à ce que la figure de Lissajou sur l'oscilloscope devienne un cercle horizontal (déphasage 90°).

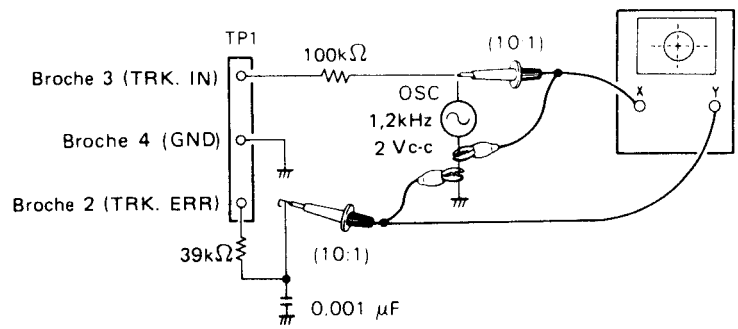


Fig. 9-7

Photo. 9-13 Gain élevé

Photo. 9-14 Gain optimum

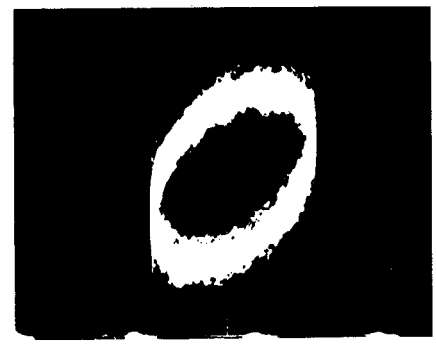
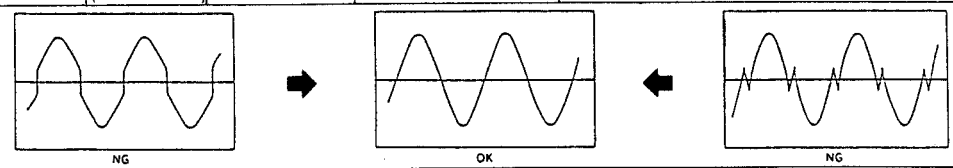


Photo. 9-15 Gain réduit

Pas No.	Réglage de l'oscilloscope V	Réglage de l'oscilloscope H	Points d'essai	Points de réglage	Points de contrôle/ spécifications de réglage	Méthode de réglage
10.	**RÉGLAGE DE LA FRÉQUENCE PROPRE DU VCO**					
			TP2 Broche 2	VR8 (VCO.ADJ)	4.275 ±0.025 MHz	• Régler le mode d'essai (TEST). (Voir page 45.) • Court-circuiter entre les ponts ASY et GND au moyen de l'outil de réseau, etc. (Figure 9-8) • Raccorder un fréquencemètre capable de mesurer au-dessus de 10 MHz à la broche 2 de TP2. • Ajuster le potentiomètre VR8 VCO ADJ (réglage du VCO) de façon à ce que la valeur indiquée par le fréquencemètre devienne égale à 4,275±0,025 MHz.
11.	**MÉTHODE DE CONTRÔLE DE LA CARACTÉRISTIQUE S (ERREUR DE FOCALISATION)**					
						• Régler le mode d'essai (TEST). (Voir page 45.) • Réaliser un court-circuit entre la broche 5 FCS.IN (entrée de focalisation) de TP1 et la terre GND. • Appuyer sur la touche d'avance de piste (TRACK FWD) (⋈) et observer simultanément la forme d'onde à la broche 6 FCS.ERR (erreur de focalisation) de TP1 au moyen d'un oscilloscope.
12	**MSB adjustment**					
	5 mV/div	0.2 ms/div	Borne de sortie de ligne (LINE OUT) JA1 (canal gauche)	VR702	Onde sinusoïdale	• Régler l'appareil en mode d'essai (voir page 45). • Reproduire la 20ème plage (−60 dB, 1 kHz, canal G/D) du disque d'essai (YEDS-7). Raccorder un oscilloscope au canal gauche des bornes de sortie de ligne (LINE OUT) et observer la forme d'onde de sortie audio. • Ajuster VR702 MSB.ADJ Lch (ajustement MBS, canal droit) pour que la forme d'onde sur l'oscilloscope devienne sinusoïdale. • Effectuer le même ajustement pour le canal droit (VR701).
			Borne de sortie de ligne (LINE OUT) JA1 (canal droit)	VR701	Onde sinusoïdale	



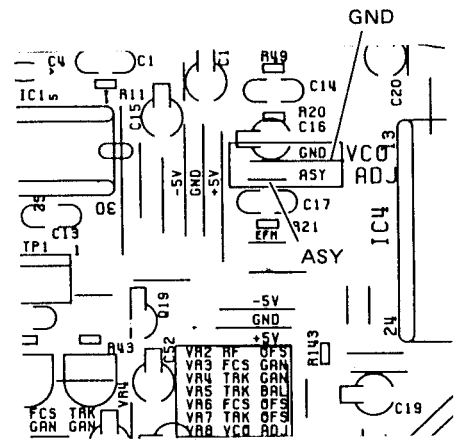


Fig. 9-8

9. AJUSTE

Los items de ajuste de este modelo deberán ser efectuados en el orden mostrado abajo.

• Itemes de ajuste y comprobación

1. Ajuste de desviación de seguimiento, foco y RF.
2. Ajuste del nivel de RF
3. Confirmación de la alimentación de salida de LD (diodo láser)
4. Confirmación de enclavamiento del enfoque y del eje
5. Ajuste del retículo
6. Ajuste del equilibrio de seguimiento
7. Ajuste tangencial
8. Ajuste de la ganancia de enfoque
9. Ajuste de la ganancia de seguimiento
10. Ajuste de la frecuencia propia de VCO
11. Método para confirmar el carácter S (error de enfoque)
12. Ajuste de MSB

• Equipo de medición

1. Osciloscopio de doble traza
2. Medidor de alimentación del láser
3. Disco de prueba (YEDS7)
4. Filtro de ajuste de equilibrio de seguimiento
5. Filtro de ajuste de ganancia de bucle
6. Generador de senñal
7. Contador de frecuencia
8. Otras herramientas generales

• Modo de prueba

Todos los ajustes deberán ser ejecutados en el modo de prueba.

Ajuste del modo de prueba y los procedimientos de cancelación

(1) Para disponer el mode de prueba, coloque en ON el interruptor POWER del reproductor (S401) mientras presiona el interruptor TEST MODE (S1). (terminales del modo de ajuste).

(2) Para cancelar el modo de prueba, simplemente gire el interruptor de POWER del reproductor a OFF.

Las varias funciones de tecla en el modo de prueba están enlistadas en la Tabla 9-1.

• Puntos de ajuste

VR1: Alimentación del láser
VR7: Desviación del seguimiento (TRK.OFS)
VR3: Ganancia de enfoque (FCS.GAN)
VR4: Ganancia de seguimiento (TRK.GAN)
VR5: Equilibrio de seguimiento (TRK.BAL)
VR6: Desviación de enfoque (FCS.OFS)
VR8: Ajuste de VCO
VR2: Compensación de RF (RF.OFS)

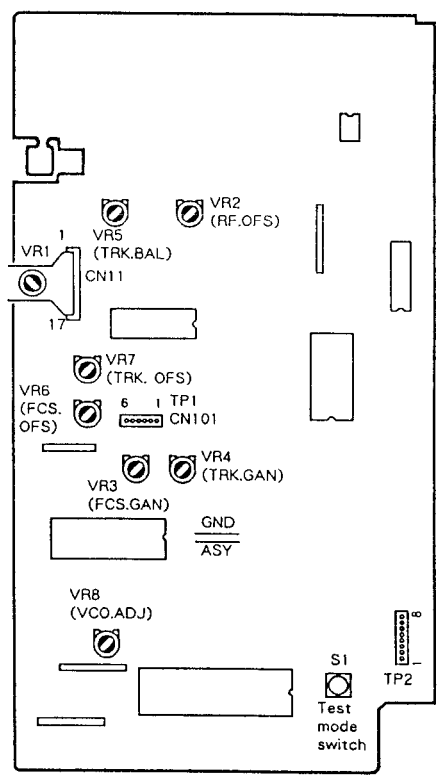
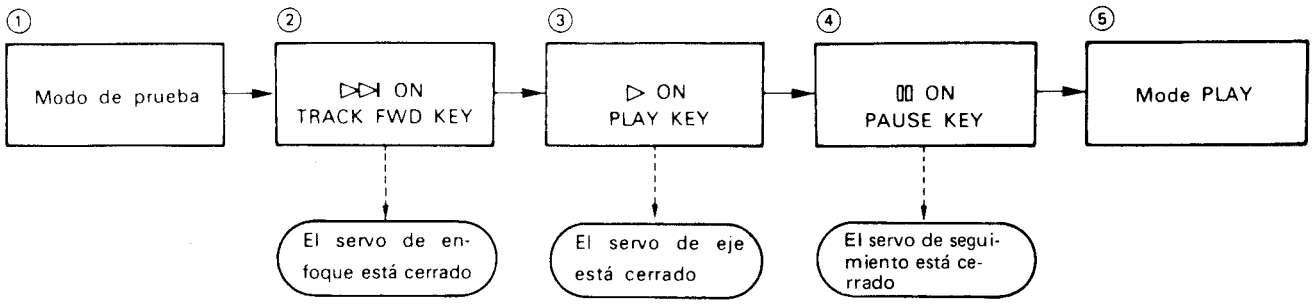


Fig. 9-1 Punto de ajuste

En el modo de prueba, cada servocircuito puede ser cerrado y abierto por operaciones separadas. Consecuentemente, cada servo deberá ser cerrado uno a la vez (en secuencia en serie) para ajustar el modo de PLAY (reproducción).
Fíjese que el modo de PLAY no se activa simplemente presionando la tecla de PAUSE (pausa) (▯▯) en el modo de prueba.

Ejemplo: Conmutando del modo de STOP (parado) a PLAY.

* Cada servomecanismo funciona en una secuencia en serie en el modo de prueba.



• Funciones de tecla en el modo de prueba

Símbolo	Nombre de tecla	Función durante el modo de prueba	Descripció
▷▷|	TRACK FWD	El servo de enfoque está cerrado.	El diode láser se enciende. El actuador se mueve arriba/abajo, luego se cierra el servo de enfoque.
▷	PLAY	El servo de eje está cerrado.	El eje comienza a rotar y se cierra el servo cuando se convierte en el modo de servo CLV-A.
▯▯	PAUSE	El servo de seguimiento está cerrado/abierto	Ejecuta la operatión de conexión oscilante. Cuando se cierra el servo de seguimiento y se pone en el modo de PLAY presionando esta tecla (el servo de enfoque y el del eje deberán estar cerrados), y el indicador de pausa se enciende. El servo de seguimiento se abre presionando de nuevo la tecla.
◁◁	MANUAL SEARCH REV	El carro se mueve en la dirección inversa (hacia el centro del disco)	El carro se mueve hacia el centro del disco a una alta velocidad de como 3 cm/seg. Ya que no existe un mecanismo de seguridad para detener el carro, libere la tecla cuando el carro llegue al final.
▷▷	MANUAL SEARCH FWD	El carro se mueve en la dirección hacia delante. (hacia el final del disco)	El carro se mueve hacia el final del disco a una alta velocidad de como 3 cm/seg. Ya que no existe un mecanismo de seguridad para detener el carro, libere la tecla cuando el carro llegue al final.
□	STOP	PARADO	Todos los servos están abiertos.
⏏	EJECT	(Cargador de discos compactos)	El cargador de discos compactos. Sin embargo, el captador no regresa a su posición de aparcamiento. Además, aun cuando se cierra el disco el captador permanece tal como está.

Tabla 9-1

No. de paso	Ajuste del osciloscopio V	Ajuste del osciloscopio H	Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
1	AJUSTES DE COMPENSATION DE SEGUIMIENTO, FOCO Y RF					
			Patilla 2 de TP1 (TRK. ERR)	VR5 (TRK.BAL) VR7 (TRK.OFS)	45° 0V±50 mV	• Ajuste el modo de prueba. (vea la página56.) • Gire el volumen de TRK.BAL (Equilibrio de seguimiento) de VR5 en el sentido de las manecillas del reloj 45°del centro. • Ajuste VR7 TRK.ERR (de seguimiento) de modo que el voltaje en TRK.ERR (desviación de seguimiento) de la patilla 2 de TP1 se ponga en 0V±50 mV.
			Patilla 6 de TP1 (FCS. ERR)	VR6 (FCS. OFS)	Compens. de foco 0V ± 50mV	• Ajuste VR6 FCS.OFS (compensación de foco) de modo que el voltaje de FCS.ERR (error de foco) en la patilla 6 de TP1 sea 0V ± 50mV.
			Patilla 1 de TP1 (RF OUTPUT)	VR2 (RF OFS)	Compens. de RF 100mV ± 50mV	• Ajuste VR2 RF.OFS (compensación de RF) de modo que el voltaje de salida de RF en la patilla 1 de TP1 sea 100 mV ± 50 mV.
2	AJUSTE DEL NIVEL DE RF					
			Patilla 1 de TP1 (RF)	Alimentación del laser VR1	1,5Vp-p $^{+0,2}_{-0}$ V	• Ajuste el mode de TEST: (Vea la página56.) • Reproduzca el disco de TEST y conecte la sonda de un osciloscopio a la RF de la patilla 1 (Salida de RF) de TP1 y mida el voltaje de P-P de la forma de onda de RF. • Ajuste UR1 (alimentación del láser) que el valor sea 1,5Vp-p $^{+0,2}_{-0}$ V.
3	CONFIRMACION DE ALIMENTACION DE ALIDA DE LD (DIODO LASER)					
					Confirmación Menos de 0,13 mW	• Ajuste el modo de prueba. (vea la página56.) • Presione la tecla de TRACK FWD (▷⋈) y encienda el LD (Diodo láser). • Ubique el sensor del medidor de potencia del láser inmediatamente arriba del objetivo, y confirme que la potencia de salida del LD sea menos de 0,13 mW.
4	CONFIRMACION DE BLOQUEO DE ENFOQUE Y DEL EJE					
	0,5V/div	100 mseg/div	Patilla 1 de TP1 (Salida de RF)		Existe salida de RF Rotación normal	• Ajuste del disco de TEST. • Ajuste del mode de TEST. (Vea la página56.) • Cambie el captador cerca del centro del disco presionando la tecla de MANUAL SEARCH FWD (▷▷). • Tenga en cuenta que este paso deberá ser ejecutado. • Observe RF (Radio frecuencia) de la patilla 1 de TP1 con un osciloscopio y confirme que se saque la senñal de RF después de presionar la tecla de TRACK.ERR (▷⋈). • Presione la tecla de PLAY (▷) y asegúrese que el disco rota en la dirección normal casi a la velocidad especificada (tal como está cerca del centro del disco, la velocidad de rotación es alrededor de 30 rpm) y que no rote anormalmente o inversamente.

No. de paso	Ajuste del osciloscopio V	Ajuste del osciloscopio H	Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
5	**AJUSTE DE LA MIRA**					
						• Ajuste el mode TEST. (Vea la página56.) • Cambie el captador cerca del centro del disco presionando la tecla de MANUAL SEARCH FWD (▷▷) de modo que el tornillo de ajuste de retículo del captador pueda ser visto a través del orificio oval en el lado superior del servomecanismo. • Inserte un impulsor de retículo en el orificio del lado superior or del mecanismo come se muestra en la Fig. 9-2, y confirme que gira el tornillo de retículo. • Presione la tecla de TRACK FWD (▷▷|) y la tecla de PLAY (▷) secuencialmente y cierre el servo de enfoque y el del eje. (No cierre el servo de seguimiento.) • Observe la forma de onda en TRCK.ERR (Error de seguimiento) de la patilla 2 de TP1 con un osciloscopio. Luego inserte un filtro de paso bajo de corte. (Fig. 9-3)
	0.5V/div	5 ms/div	TRK.ERR de la patilla 2 de TP1	Retículo	Punto cero Amplitud máxima	• Gire el impulsor de reticulo y encuentre el punto cero (Foto. 9-1) • Luego, gire lentamente el impulsor de retículo hacia **el seutido contrario del reloj** desde el punto cero y ajuste en el punto donde la forma de onda (Señal de error de seguimiento) primeramente se ponga a una amplitud máxima. (Vea Foto 9-3) Nota: Si el impulsor de retículo se presiona fuertemente, el captador se mueve hacia el centro del disco, por consiguiente el ajuste resulta difícil. • Finalmente, asegúrese de confirmar que la señal de error de seguimiento (en este momento, no se ha insertado el filtro de paso bajo de corte de 4 kHz) cuando el captador se mueve hacia el centro del disco y el voltaje de P-P do la señal de error de seguimiento en la circunferencia exterior del disco no haya variado considerablemente. Cuando se desvía el nival arriba de ±10%, ajuste de nuevo girando el tornillo de retículo a un punto de amplitud de error mínimo.

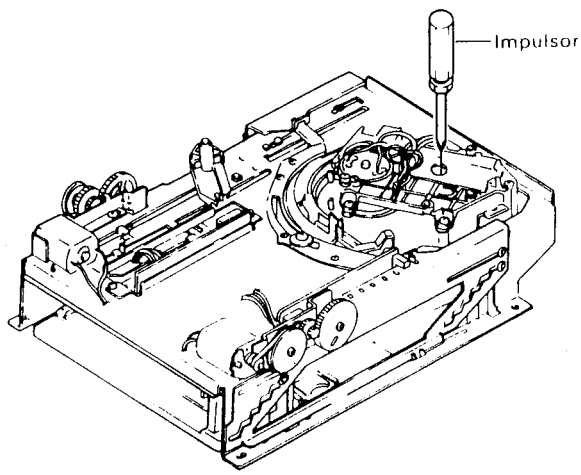


Fig. 9-2

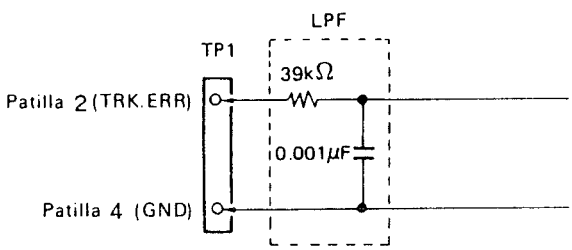


Fig. 9-3

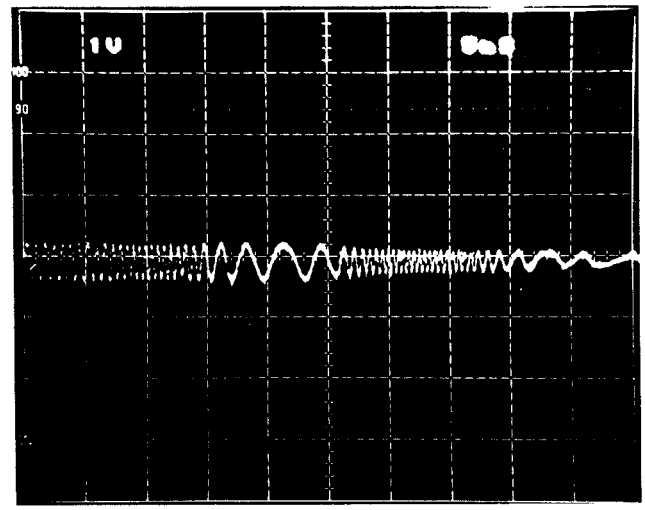


Foto. 9-1 Punto cero

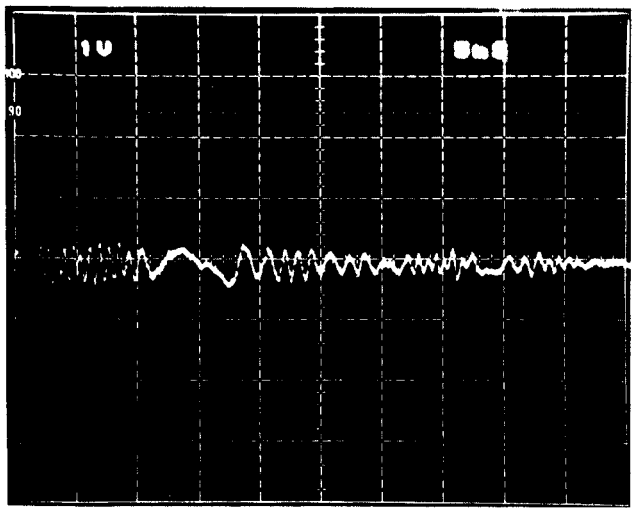


Foto. 9-2 Forma de onda de un punto no cero

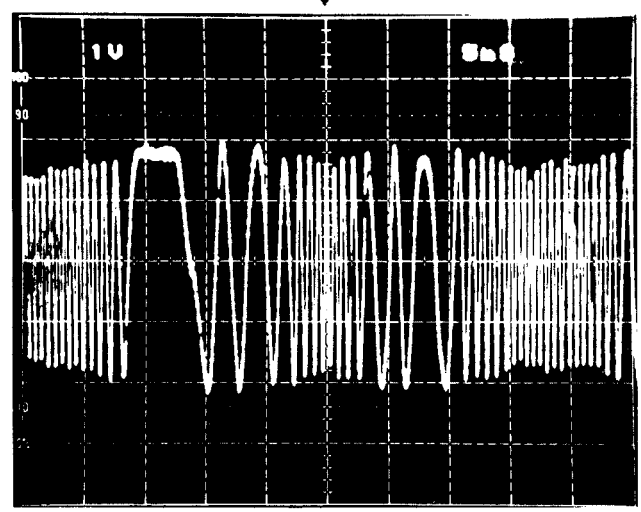


Foto. 9-3 Amplitud máxima

No. de paso	Ajuste del osciloscopio V	Ajuste del osciloscopio H	Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
6	**AJUSTE DE EQUILIBRIO DE SEGUIMIENTO**					
	0,5V/div	5 mseg /div	Patilla 2 de TP1 (TRK.ERR)	VR5 (TRK.BAL)	TRK.ERR	• Ajuste el disco de TEST. • Ajuste el mode de TEST. (Vea la página 56.) • Cambie el captador cerca del centro del disco presionando la tecla de MANUAL SEARCH FWD (▷▷). • Presione la tecla de TRACK FWD (▷▷|) y la tecla de PLAY (▷) para comenzar a voltear el disco. • Obseve TRK.ERR (Error de sequimiento) de la patilla 2 de TP1 con un osciloscopio y ajuste con el volumen de TRK.BAL (Equilibrio de seguimiento) de VR5 de modo que la componente de CC del error de seguimiento desaparezca. Nota: Antes de realizar los ajustes indicados arriba, asegúrese de compensar el error de seguimiento.

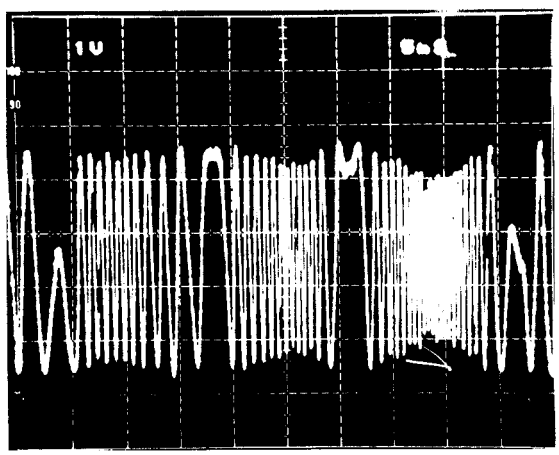


Foto. 9-4 Existe componente de CC

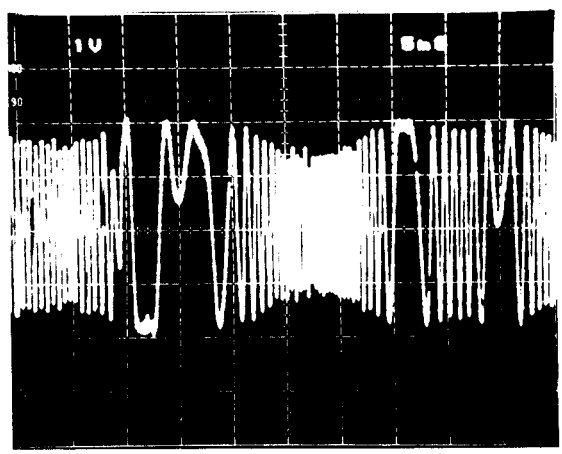


Foto. 9-5 No existe componente de CC

No de paso	Ajuste del osciloscopio V	Ajuste del osciloscopio H	Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
7	AJUSTE TANGENCIAL					
		200 nS	Patilla 1 de TP1 (Salida de RF)	Tornillo de ajuste de la tangencial	Mejor imagen de prueba	• Ajuste el disco de TEST. • Ajuste el mode de TEST. (Vea la página 56.) • Cambie el carro cerca del centro del disco presionando la tecla de MANUAL SEARCH FWD (▷▷). • Presione la tecla de TRAK FWD (▷▷|), la tecla de PLAY (▷) y la tecla de PAUSE (⏸) secuencialmente, y cierre todos los servos. (El indicador de pausa se enciende.) • Observe el RF de la patilla 1 (Salida de RF) de TP1 con un osciloscopio y ajuste con el tornillo de la tangencial de modo que la imagen de prueba resulte nítida. (Fig. 9-4) • El punto de ajuste es el punto medio entre el punto donde la imagen de prueba se deteriora girando el tornillo de la tangencial en el sentido de las manecillas del reloj, y el punto donde la imagen de prueba se deteriora girando el tornillo de la tangencial en contra del sentido de las manecillas del reloj. Como un criterio, observe que la forma de onda en conjunto sea nítida y que una de las figuras de diamante esté dentro de la imagen de prueba (Foto. 9-6), y ajuste al punto óptimo donde la forma de diamante se vea relativamente como una línea fina.

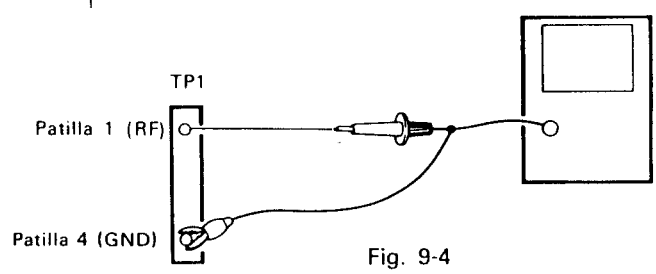
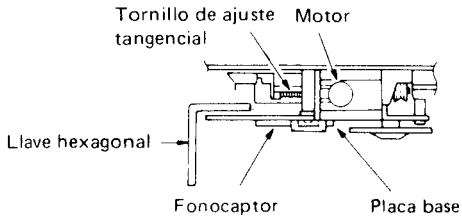


Fig. 9-4

(Nota) Durante el ajuste, sostenga la llave hexagonal hacia arriba para evitar que el cuerpo del captador vaya hacia abajo.



En la figura siguiente, las partes superior e inferior son opuestas a las del producto real.

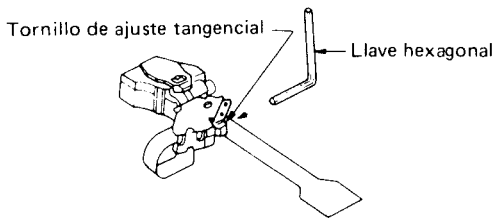
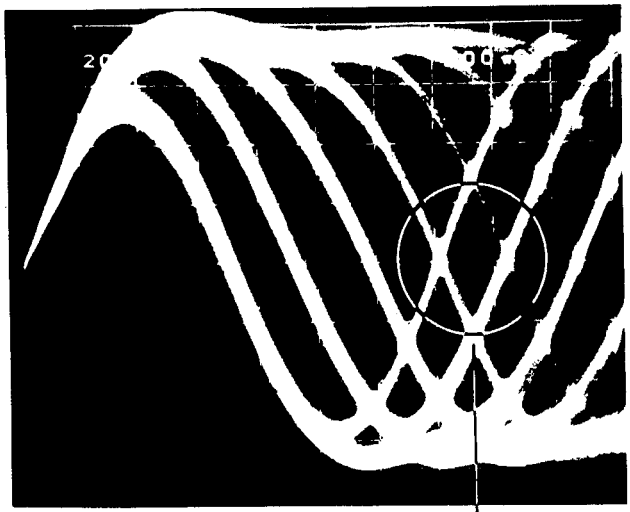


Fig. 9-5 Ajuste tangencial



Parte a ser observada

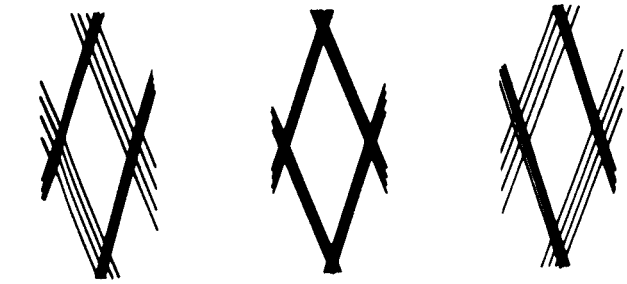


Foto. 9-6

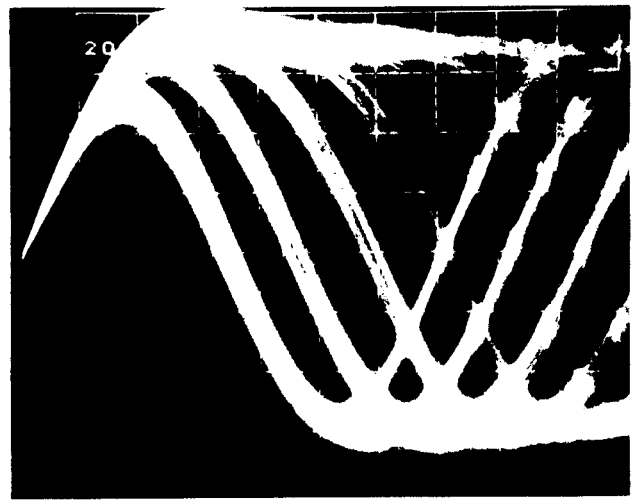


Foto. 9-7

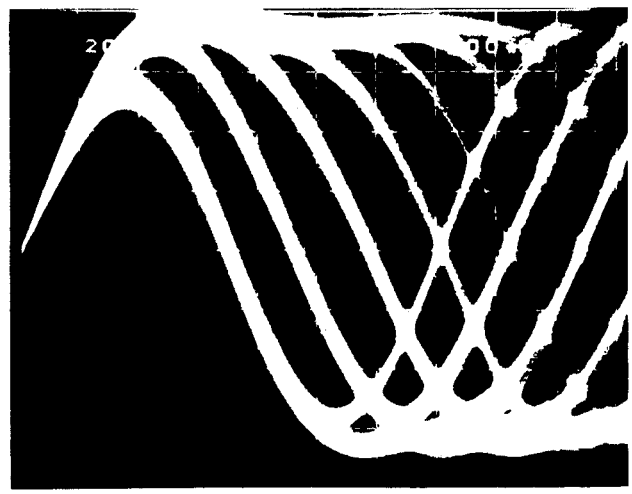


Foto. 9-8

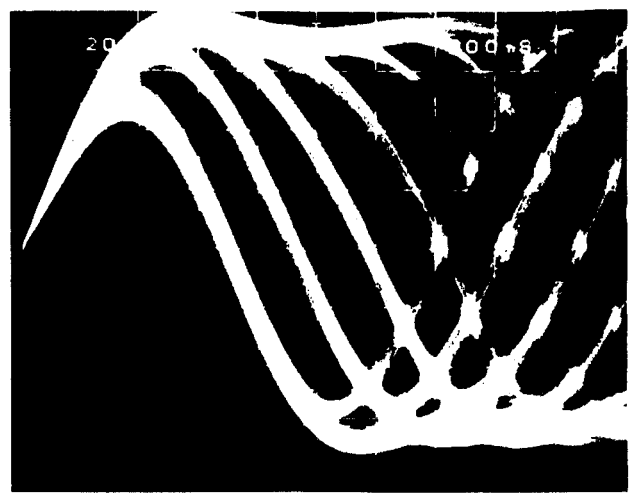


Foto. 9-9

No. de paso	Ajuste del osciloscopio V	Ajuste del osciloscopio H	Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
8	AJUSTE DE GANANCIA DE ENFOQUE					
	20 mV/div.5/mV/div. CH1 (X), CH2 (Y) (SONDA 10:1)		Eje X Patilla 5 de TP1 (FCS.IN) Eje Y Patilla 6 de TP1 (FCS.ERR)	VR3 (GANACIA FCS)	Diferencia de fase 90°	• En el estado de POWER OFF (apagado), conecte el osciloscopio y el oscilador como se muestra en la Fig. 9-6. • Ajuste el modo de TEST. (Vea la página 56.) • Presione la tecla de TRACK FWD (▷▷|), la tecla de PLAY (▷) y la tecla de PAUSE (▯▯) secuencialmente, y encienda el servo de enfoque, el del eje y el de seguimiento. • Encienda el oscilador y extraiga 1,6kHz 1 Vp-p. Nota: (Dependiendo en los osciladores, algunos de ellos producen CC cuando son encendidos. Por lo tanto, es conveniente conectar el oscilador después del encendido.) • Ajuste con el volumen de FCS.GAN (Ganancia de enfoque) de VR3 de modo que la figura de Lissajous del oscilloscopio a ser un círculo horizontal (90° de diferencia de fase).

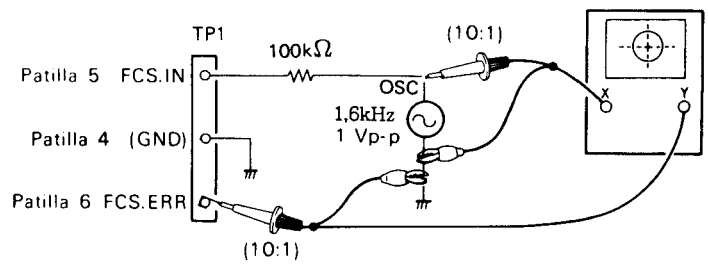


Fig. 9-6

Foto. 9-10 Alta ganacia

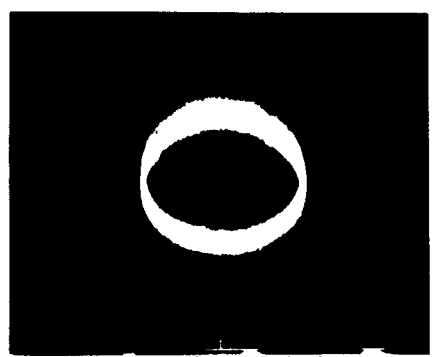


Foto. 9-11 Ganacia óptima

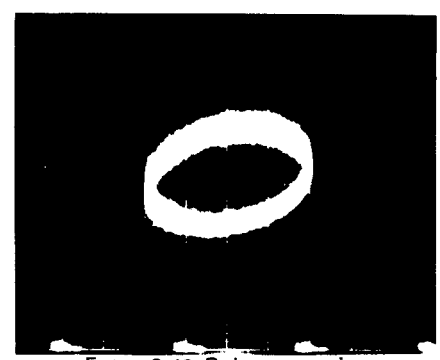


Foto. 9-12 Baja ganancia

No. de paso	Ajuste del osciloscopio V	Ajuste del osciloscopio H	Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
9	AJUSTE DE GANANCIA DE SEGUIMIENTO					
	50 mV/div. 5 mV/div. CN1 (X), CH2 (Y) (SONDA 10:1)		Eje X Patilla 3 de TP1 (TRK.ERR) Eje Y Patilla 2 de TP1 (TRK.ERR)	VR4 (TRK.GAN)	90° de diferencia	• En el estado de POWER OFF (apagado), conecte un osciloscopio y un oscilador como se muestra en la Fig. 9-7. • Ajuste el modo de TEST. (Vea la página 56.) • Presione la tecla de TRACK FWD (▷▷|), la tecla de PLAY (▷), y la tecla de PAUSE (▯▯) secuencialmente, y encienda el servo del enfoque, el del eje y el de seguimiento. • Encienda el oscilador y extraiga 1,2 kHz 2 Vp-p. Nota: (Dependiendo en los osciladores, algunos de ellos producen CC cuando son encendidos. Por la tanto, es conveniente conectar el oscilador después del encendido.) • Ajuste con el volumen de TRAK GAN de VR4 (Ganancia de seguimiento) de modo que la figura de Lissajous del osciloscopio llege a ser un círculo horizontal (90° de diferencia de fase).

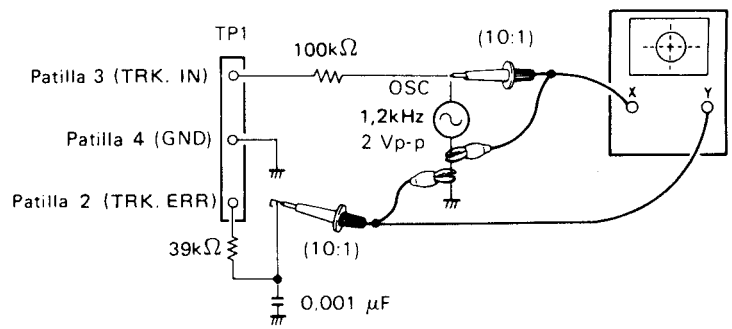
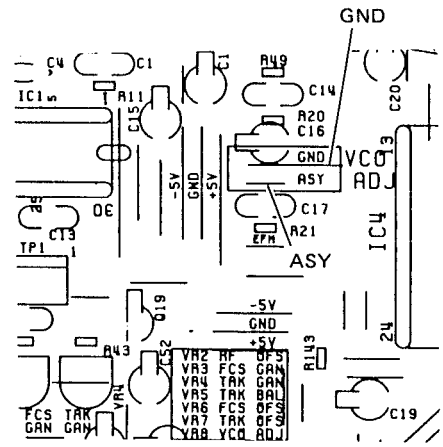


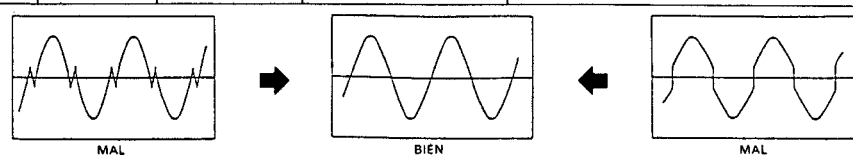
Fig. 9-7

Foto. 9-13 Alta ganacia

Foto. 9-14 Ganancia óptima

Foto. 9-15 Baja ganancia

No. de paso	Ajuste del osciloscopio V	Ajuste del osciloscopio H	Puntos de prueba	Puntos de ajuste	Items de verificación/ Especificaciones de ajuste	Procedimiento de ajuste
10	AJUSTE DE LA FRECUENCIA PROPIA DE VCO					
			Patilla 2 de TP2	VR8 (VCO.ADJ)	4.275 ±0,025 MHz	• Ajuste el modo de TEST. (Vea la página 56.) • Haga un cortocircuito entre ASY y la conexión volante de GND con impulsor de retículo, etc. (Fig. 9-8) • Conecte el frecuencímetro, que pueda medir arriba de 10 MHz, a la patilla 2 de TP2. • Ajuste con el volumen VCO ADJ (ajuste de VCO) de VR8 de modo que el valor del frecuencímetro se ponga en 4,275 ±0,025 MHz.  Fig. 9-8
11	METODO PARA CONFIRMAR EL CARACTER S (ERROR DE ENFOQUE)					
						• Ajuste el modo de TEST. (Vea la página 56.) • Haga un cortocircuito entre FCS.IN (Entrada de enfoque) de la patilla 5 de TP1 y GND. • Presione la tecla de TRACK FWD (▷▷|) y observe la forma de onda de FCS.ERR (Error de enfoque) de la patilla 6 de TP1 con un osciloscopio.
12	Ajustement MBS					
	5 mV/div	0.2 mseg/div	JA1 Terminal LINE OUT (Canal izquierdo)	VR702	Onda sinusoidal	• Ponga la unidad en el modo de reproducción normal. (consulte la página 56). • Reproduzca la melodía n.° 20 (−60 dB, 1 kHz, canal izquierdo/derecho (YEDS-7). Conecte un osciloscopio en el canal izquierdo de los terminales LINE OUT y observe la fora de onda de la salida de audio. • Ajuste VR702 MSB.ADJ Lch (ajuste de MSB, canal izquierdo) de forma que la forma de onda del osciloscopio sea una onda sinusoidal. • Realice el mismo ajuste para el canal derecho (VR701).
			JA1 Terminal LINE OUT (Canal derecho)	VR701	Onda sinusoidal	



10. FOR HB TYPE

10.1 CONTRAST OF MISCELLANEOUS PARTS

NOTES:

Parts without part number cannot be supplied.

The ⚠ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

- *For your parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.*

  ★★ GENERALLY MOVES FASTER THAN ★

  This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.
- *Parts marked by "◉" are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.*

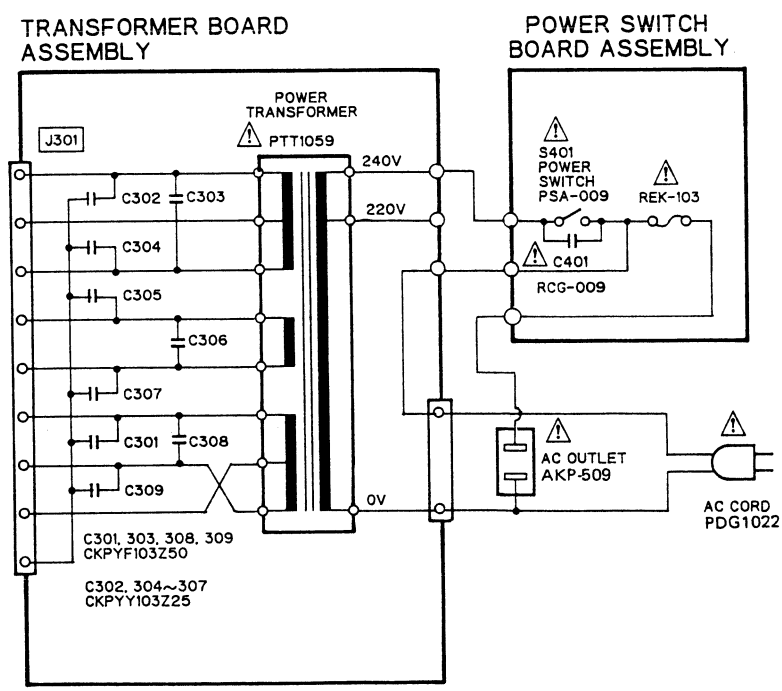
  Shipment is made with the caution card affixed to the glass door.

The PD-X940M/HB type is the same as the PD-X940M/HEM type with the exception of the following sections.

Mark	Symbol & Description	Part No.		Remarks
		PD-X940M/HEM	PD-X940M/HB	
⚠	1P AC outlet	AKP-508	AKP-509	
⚠	AC power cord	PDG1003	PDG1022	
	Operating instructions (English)	...	PRB1057	
	Operating instructions (English/French/German/Italian)	PRE1043	...	
	Operating instructions (Dutch/Swedish/Spanish/ Portuguese)	PRF1015	...	

10.2 SCHEMATIC DIAGRAM

- **For HB type**



Line Voltage Selection (for HEM and HB types)

• Line voltage can be changed with the following steps.

1. Disconnect the AC power cord.
2. Remove the bonnet case.
3. Change the connection wire from Power switch board assembly (Terminal NO. ③) to Transformer board assembly (Terminal NO. ① or ②) as follows.

Voltage	Terminal NO. of Transformer board assembly
220V	①
240V	②

4. Stick the line voltage label on the rear panel.

Description	Part No.
220V label	AAX-193
240V label	AAX-192